North Dakota State University
CROP & PEST REPORT
NDSU EXTENSION

No. 11 July 14, 2022

Inside this Issue...

AG NDSU FIELD DAYS SET

The North Dakota State University Research Extension Centers annual field days are set. The events take place at the Research Extension Center sites across the state and feature speakers, presentations and tours covering a diverse array of topics. NDSU's 15th President, David Cook, will be attending this year's field day events.

The dates and locations for the field days are:

July 14 – Williston Research Extension Center irrigated tour – Nesson Research and Development farm, located 23 miles E of Williston on Hwy 1804 (8:30 a.m.-Noon CDT)

July 18 – Agronomy Seed Farm – Casselton
(5 p.m. CDT agronomy tour, 7 p.m. supper)

July 19 – Carrington Research Extension Center – Carrington
(9:15 a.m.-3:30 p.m. CDT)

July 20 – North Central Research Extension Center – Minot
(8:30 a.m.-Noon CDT)

July 21 – Langdon Research Extension Center – Langdon
(8:45 a.m.-Noon CDT)

August 4 – CREC Oakes Irrigation Research Site – Oakes
(8:30 a.m.-Noon CDT)

August 9 – NDSU Horticulture Research & Demonstration Gardens – Fargo
(3-7 p.m. CDT plants, local foods and outdoor spaces)

*September 10 –NDSU Arboretum near Absaraka (12-5pm CDT trees and ornamentals) pre-registration required

*Note: This event has had a change of place and time

SUGARBEET PLOT SUMMER TOUR 2022 SCHEDULE

July 14	**2:00 PM**	***Ada, MN* "Weed Tour"** *Directions:* (Ada - GPS: 47.42671° N, 96.60213° W) ◦ The plot is located along Norman County 121 about 3 miles east of Norman County 18. Plot is about one mile south and three miles west of Lockhart, MN.
July 20	**12:45 PM**	***Crookston, MN*** ◦ Management of Major diseases- Ashok Chanda ◦ Sugarbeet Tolerance with Ultra Blazer in Sugarbeet- Thomas Peters ◦ Interseeding Cover Crops into Sugarbeets- Lindsay Pease *Directions:* Crops & Soils Day will be held at the NWROC's Maintenance/Farm Operations Building located south of Polk County Hwy 71 on NWROC's campus. Parking is across from the office. ***Complimentary Lunch Served from noon to 1:00 PM***
July 26	**10:00 AM**	*St. Thomas, ND* – "Root Maggot Control Research and Cercospora Leaf Spot." Dr. Boetel will discuss management options for sugarbeet root maggot; Dr. Chenggen will provide an update on his breeding trials; Dr. Khan will discuss options for managing Cercospora leaf spot. *Directions:* 48.5645937, -97.4580947; One-half mile directly W. of former Pete Carson farmstead. Access field by using dirt road from West. **No traffic through farmstead please!** **From Drayton:** Exit (#187) on I-29; West 12 mi. to ND Hwy 66/US 81 intersection; then west 1 mi. to 147th Ave. NE; South ½ mi. to dirt field rd.; East 0.5 mi.; plots are on S. side of road. **From Grafton:** North 9.5 mi. on US 81 to 79th St. NE; West 1 mi. to 147th Ave. NE; North ½ mi. to dirt field rd.; East 0.5 mi.; plots are on S. side of road. **From St. Thomas:** S. on US 81 2.5 mi. to ND Hwy 66/US 81 intersection; west 1 mi. to 147th Ave. NE; South ½ mi. to dirt field rd.; East 0.5 mi.; plots are on S. side of road. ***Lunch sponsored by AMVAC at St. Thomas Firehouse***
July 27	**10:00 AM**	*Moorhead, MN* -"Waterhemp control in sugarbeet." Dr. Tom Peters will discuss waterhemp control; use of Ultra Blazer; and fall seeded cover crops. *Directions:* The American Crystal Sugar Technical Center (46.890790 -96.757104). Entrance is along 15th Avenue N, east of the Moorhead Drivers Exam Office. Please do not park in the grassy areas between the trees. **Betaseed will sponsor lunch at Buffalo Wild Wings at 11:45 or immediately after the tour.**
Aug 30	**10:00 AM**	*Foxhome, MN*-"Controlling Cercospora leaf spot in sugarbeet". Dr. Khan will show the effects of using individual and fungicide mixtures for controlling Cercospora, the effect of application timing of fungicides for controlling Cercospora in susceptible and CR+ varieties, and the impact of water volume with fungicides for controlling Cercospora. *Directions:* From the intersection of Hwy 75 and 210 in Breckenridge ◦ East 11.7 miles on Hwy 210 ◦ Turn North on 310th Ave for 0.5 mile ◦ Turn West on grassy field approach **Lunch will be sponsored by Betaseed at Foxhome Bar & Grill, Foxhome, MN**

entomology

IPM INSECT TRAPPING UPDATE

We will be posting and reporting weekly trapping results for insect pests of wheat, canola and sunflower on the NDSU Extension ***IPM website*** and in the ***Crop & Pest Report***.

Wheat: IPM Scouts have placed pheromone traps out for true armyworm and black cutworm at 18 trap sites in 18 counties (Table 1). Overall, **moth numbers in pheromone traps are low this past week**. Good news!

Trap catches for **true armyworm** continue to be low with <10 moths per trap per week at 28% of the trap sites. The total number of true armyworms decreased by half from the peak week of trapping, June 27-July 3.

Black cutworm was observed at two of the 18 trap sites (only 1 moth captured at each site) in Traill and McIntosh Counties.

Table 1. 2022 pheromone trap catches for true armyworm and black cutworm in wheat, ND.

Area	County	True armyworm				Black cutworm			
		June 13-19	June 20-26	June 27-July 3	July 4-10	June 13-19	June 20-26	June 27-July 3	July 4-10
SE	Cass	-	0	7	7	-	0	0	0
EC	Traill	-	-	9	10	-	-	1	1
EC	Griggs	-	-	4	0	-	-	0	0
NE	Pembina	-	-	0	0	-	-	0	0
NE	Ramsey	-	0	2	0	-	0	0	0
NE	Rolette	-	-	1	0			0	0
Central	Foster	0	0	0	1	0	0	0	0
Central	Wells	1	0	2	5	0	0	0	0
SC	McIntosh	-	0	0	4	-	0	0	1
NC	Renville	-	0	3	0	-	0	1	0
NC	Ward	-	1	0	0	-	0	0	0
WC	McLean	-	0	0	0	-	0	0	0
NW	Divide	-	0	0	0	-	0	0	0
NW	Mountrail	-	0	0	0	-	0	0	0
NW	Williams	-	0	0	0	-	0	0	0
SW	Golden Valley	10	3	6	0	0	1	0	0
SW	Morton	0	0	5	0	0	0	0	0
SW	Slope	1	0	1	0	0	0	1	0
	Total #	**12**	**4**	**40**	**27**	**0**	**1**	**3**	**2**

Canola:

IPM Scouts have placed pheromone traps out for bertha armyworm and diamondback moth at 18 traps site in 11 counties, mainly in northern canola growing areas (Table 2).

Trap catches for **bertha armyworm** were detected at low numbers, <10 moths per trap per week, at 56% of the trap sites compared to only 27% last week. Bertha armyworm threshold for scouting is based on the cumulative number of moths captured over the season. See scouting article for bertha armyworm larvae in canola, page 7.

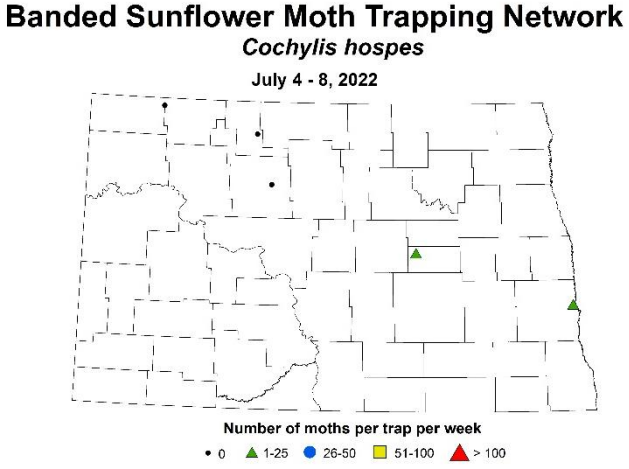
Trap catches for **diamondback moths** declined and were observed at only 39% of the trap sites compared to 53% last week. **When diamondback moth trap catches are above 100 moths per trap per week, canola fields should be scouted for larvae.** See scouting article for diamondback moth larvae in canola, page 7.

Table 2. 2022 pheromone trap catches for bertha armyworm and diamondback moth in canola, ND.

Area	County	Bertha armyworm				Diamondback moth			
		June 20-26	June 27-July 3	July 4-10	Total trap catch	June 20-26	June 27-July 3	July 4-10	Total trap catch
NC	Bottineau1	-	-	0	0	-	-	0	0
NC	Bottineau2	-	-	0	0	-	-	0	0
NC	Bottineau3	-	-	0	0	-	-	0	0
NC	Renville1	0	0	1	1	0	0	0	0
NC	Renville2	0	0	0	0	0	0	0	0
NC	Renville3	0	0	0	0	0	0	0	0
NC	Ward1	1	0	3	4	0	0	0	0
NC	Ward2	-	0	0	0	-	0	0	0
NC	Ward3	0	0	2	2	0	0	0	0
NC	Ward4	0	0	2	2	-	0	0	0
NE	Benson	-	0	0	0	-	0	11	11
NE	Cavalier2	9	8	9	26	13	28	7	48
NE	Cavalier8	-	-	1	1	-	-	7	7
NE	Pembina	0	0	2	2	0	1	7	8
NE	Ramsey	8	1	-	9	0	22	-	22
NE	Rolette	-	0	3	3	-	10	3	13
NE	Towner	10	5	4	19	1	70	42	113
NE	Walsh	0	14	-	14	0	12	-	12
SE	Cass	0	0	1	1	0	45	27	72
Total #		**28**	**28**	**28**	**84**	**14**	**188**	**104**	**306**

Sunflower:
IPM Scouts have placed pheromone traps out for banded sunflower moth, Arthuri sunflower moth and sunflower head moth at 6 traps site in 7 counties.

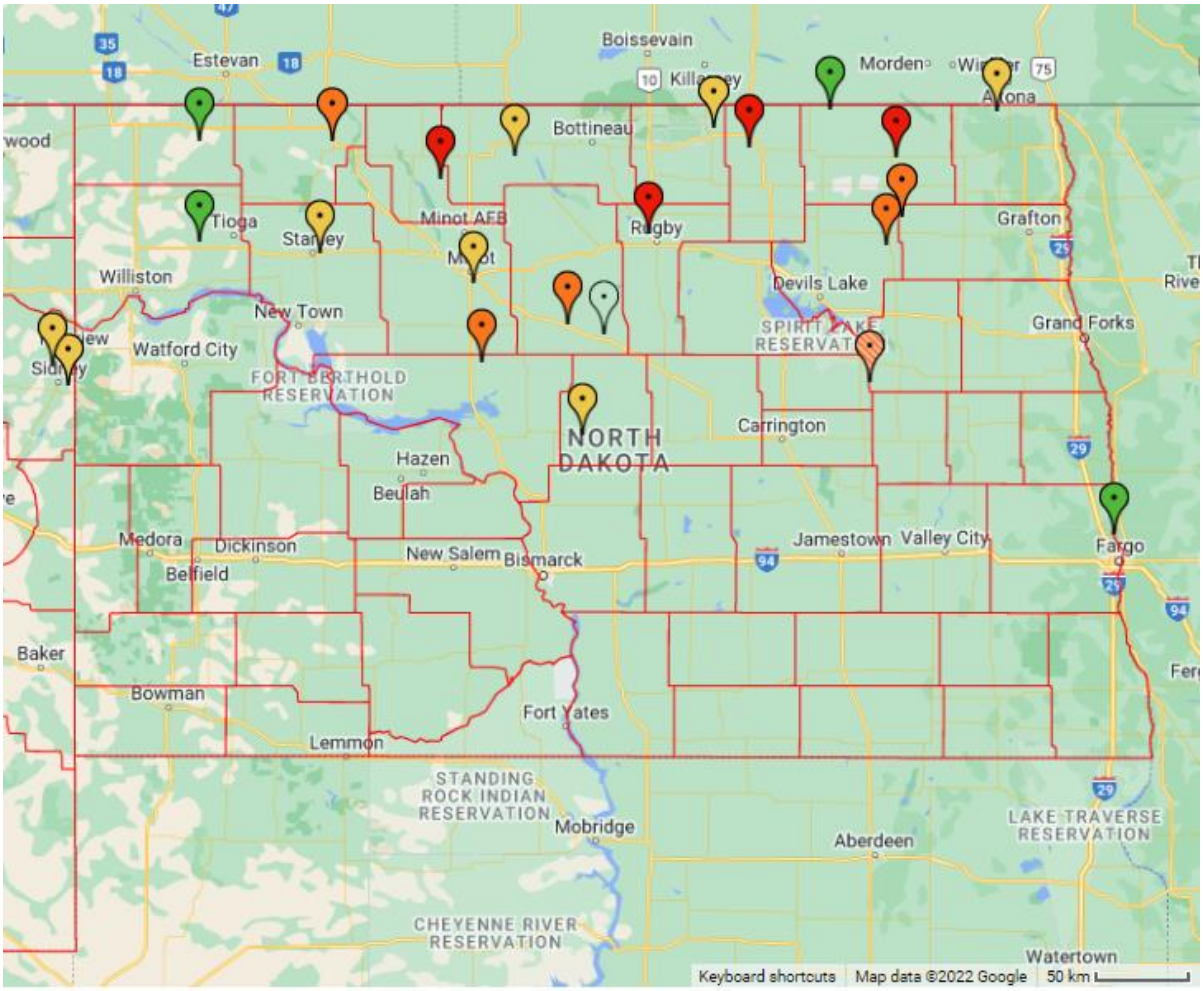
B**anded sunflower moth** has emerged in Cass, Dunn (last week) and Foster Counties. Trap catches are very low, below 10 moths per trap per week.



SCOUT FOR WHEAT MIDGE DURING PEAK EMERGENCE

Pheromone trap catches do not indicate kernel damage to wheat crop, since only male flies are captured in the traps. Female wheat midge lay eggs on wheat heads and then larvae hatch from the eggs to feed on the developing kernels, causing lower kernel weight and yield, and reduced quality. Research is continuing on this issue to further validate whether trapping can be used to predict economic losses in wheat fields. Wheat midge trapping does indicate areas with higher populations, including Renville, Pierce, Towner and Cavalier Counties. See recent trapping map results from the PestWeb website, Montana State University.

Scouting wheat fields for wheat midge during heading through 50% flowering is critical. Wheat midge populations are estimated by counting the number of adults on developing wheat heads during night scouting at five locations in a field. Examine wheat heads at dusk (after 8.30 p.m.) with a flash light when temperatures are above 59°F and wind speed is less than 6 mph. See last's week *Crop & Pest Report* issue 10, July 7, for more information.



Cumulative Midge Counts

Parasitoid Not Present

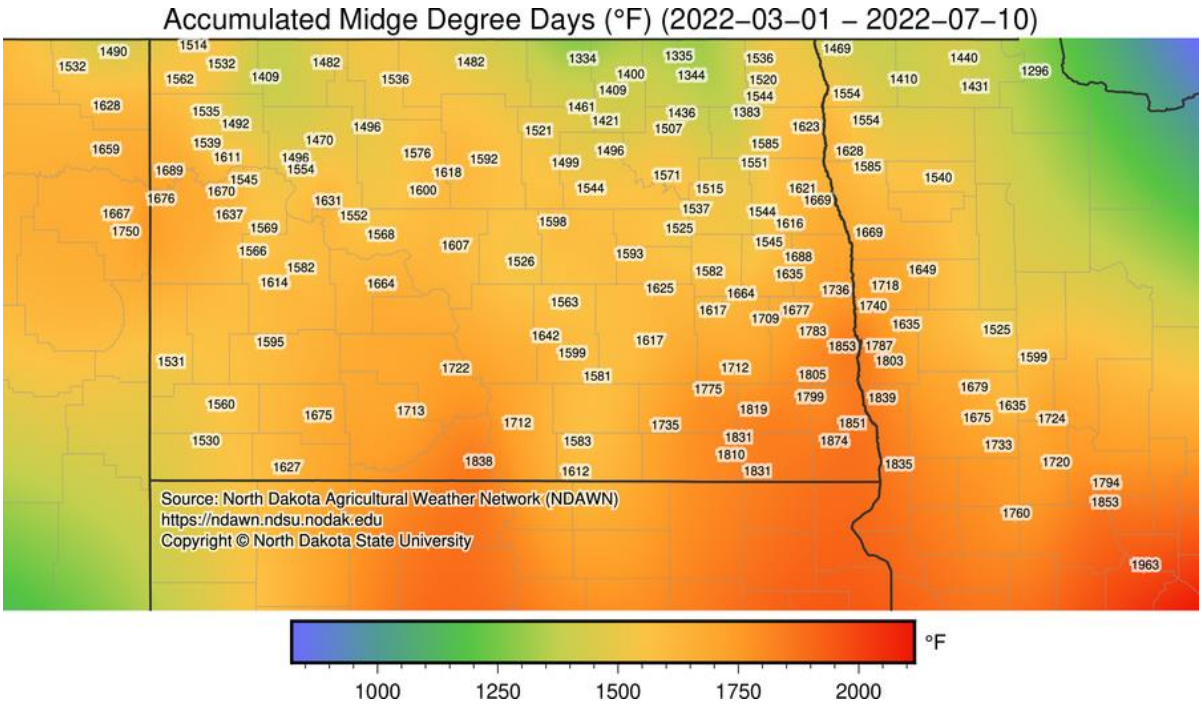
0 1 - 9 10 - 99 100 - 249 250 - 499 500 or more

Parasitoid Present

0 1 - 9 10 - 99 100 - 249 250 - 499 500 or more

Observations in northern North Dakota indicate that wheat midge degree days (DD) are between 1334 to >1600, which correlates to 10 to 90% of the female wheat midge emerged (see map below). By about 1,800 DD, adult numbers decline to the point where field activity is below economic threshold levels. However, in areas where reduced or minimum tillage is common, significant adult activity has been reported and observed up to about 1,900 DD.

DD	Biological Event
450	Wheat midge breaks larval cocoons and move close to soil surface to form pupal cocoons.
1,300	10 percent of females will have emerged.
1,475	About 50 percent of females will have emerged.
1,600	About 90 percent of females will have emerged.



2022 planting dates for hard red spring wheat indicate that 50% of the wheat was planted by May 22 and 75% by June 5 (Source: *Dakota Gold* 38(1), June 2022). Using the NDAWN 'Wheat GDD / Midge DD' application will predict the wheat growth stages, percentage of female wheat midge emerged, and the wheat susceptibility to wheat midge infestation.

Using May 22nd planting date for Minot in NDAWN shows that your wheat crop is susceptible to wheat midge and female wheat midge is 90% emerged. Scout now.

	Minot										
Date	Max Air Temp (°F)	Min Air Temp (°F)	Total Rain fall (inch)	Wheat GDD (°F)	Wheat AGDD (°F)	Est. Haun Growth Stage	Growth Stage Comment	Wheat Suscept. to Midge	Midge DD (°F)	Midge ADD (°F)	Midge Comment
2022-07-03	80	57	0.00	36	1269	8.1	Fl. L Emrg.	No	28	1358	
2022-07-04	81	62	0.01	40	1309	8.4		No	32	1390	
2022-07-05	73	64	0.00	36	1345	8.7		No	28	1418	
2022-07-06	87	62	0.00	43	1388	9.0		No	35	1453	Peak female emergence
2022-07-07	71	61	1.05	34	1422	9.2	Boot Swell	No	26	1479	~ 50% females emerged
2022-07-08	81	60	0.00	38	1460	9.5		No	30	1509	
2022-07-09	85	64	0.10	43	1503	9.8		No	35	1544	
2022-07-10	80	63	0.36	40	1543	10.0	Boot Cmplt.	Yes	32	1576	
2022-07-11	76	58	0.00	35	1578	10.3	Head Beg.	Yes	27	1603	~ 90% females emerged

Using the later date, June 5th planting date for Minot in NDAWN shows that your wheat crop is NOT susceptible to wheat midge and female wheat midge is 90% emerged.

Minot											
Date	Max Air Temp (°F)	Min Air Temp (°F)	Total Rain fall (inch)	Wheat GDD (°F)	Wheat AGDD (°F)	Est. Haun Growth Stage	Growth Stage Comment	Wheat Suscept. to Midge	Midge DD (°F)	Midge ADD (°F)	Midge Comment
2022-07-03	80	57	0.00	36	878	5.4		No	28	1358	
2022-07-04	81	62	0.01	40	918	5.7		No	32	1390	
2022-07-05	73	64	0.00	36	954	5.9		No	28	1418	
2022-07-06	87	62	0.00	43	997	6.2	Leaf 6	No	35	1453	Peak female emergence
2022-07-07	71	61	1.05	34	1031	6.5		No	26	1479	~ 50% females emerged
2022-07-08	81	60	0.00	38	1069	6.7		No	30	1509	
2022-07-09	85	64	0.10	43	1112	7.0	Leaf 7	No	35	1544	
2022-07-10	80	63	0.36	40	1152	7.3		No	32	1576	
2022-07-11	76	58	0.00	35	1187	7.5	Fl. L Vis.	No	27	1603	~ 90% females emerged

Using May 22nd planting date for Langdon in NDAWN shows that your wheat crop is NOT susceptible to wheat midge and female wheat midge is only 10% emerged.

Langdon											
Date	Max Air Temp (°F)	Min Air Temp (°F)	Total Rain fall (inch)	Wheat GDD (°F)	Wheat AGDD (°F)	Est. Haun Growth Stage	Growth Stage Comment	Wheat Suscept. to Midge	Midge DD (°F)	Midge ADD (°F)	Midge Comment
2022-07-03	80	55	0.00	35	1235	7.9		No	27	1147	
2022-07-04	72	63	0.38	36	1271	8.1	Fl. L Emrg.	No	28	1175	
2022-07-05	73	60	0.00	35	1306	8.4		No	27	1202	Male midge begins emerging
2022-07-06	81	59	0.66	38	1344	8.6		No	30	1232	
2022-07-07	69	58	0.00	32	1376	8.9		No	24	1256	
2022-07-08	77	55	0.00	34	1410	9.1	Boot Swell	No	26	1282	
2022-07-09	84	60	0.00	40	1450	9.4		No	32	1314	10% of females emerged
2022-07-10	80	61	0.28	38	1488	9.7		No	30	1344	
2022-07-11	75	59	0.00	35	1523	9.9		No	27	1371	

Using June 5th planting date for Langdon in NDAWN shows that your wheat crop is NOT susceptible to wheat midge and female wheat midge is only 10% emerged.

Langdon											
Date	Max Air Temp (°F)	Min Air Temp (°F)	Total Rain fall (inch)	Wheat GDD (°F)	Wheat AGDD (°F)	Est. Haun Growth Stage	Growth Stage Comment	Wheat Suscept. to Midge	Midge DD (°F)	Midge ADD (°F)	Midge Comment
2022-07-03	80	55	0.00	35	871	5.3		No	27	1147	
2022-07-04	72	63	0.38	36	907	5.6		No	28	1175	
2022-07-05	73	60	0.00	35	942	5.8		No	27	1202	Male midge begins emerging
2022-07-06	81	59	0.66	38	980	6.1	Leaf 6	No	30	1232	
2022-07-07	69	58	0.00	32	1012	6.3		No	24	1256	
2022-07-08	77	55	0.00	34	1046	6.6		No	26	1282	
2022-07-09	84	60	0.00	40	1086	6.8		No	32	1314	10% of females emerged
2022-07-10	80	61	0.28	38	1124	7.1	Leaf 7	No	30	1344	
2022-07-11	75	59	0.00	35	1159	7.3		No	27	1371	

Using May 22nd planting date for Rugby in NDAWN shows that your wheat crop is susceptible to wheat midge and female wheat midge is about 50% emerged. Scout now.

The later planting date, June 5th, was similar to Minot and Langdon where wheat crop is NOT susceptible to wheat midge and female wheat midge is about 50% emerged.

Rugby											
Date	Max Air Temp (°F)	Min Air Temp (°F)	Total Rain fall (inch)	Wheat GDD (°F)	Wheat AGDD (°F)	Est. Haun Growth Stage	Growth Stage Comment	Wheat Suscept. to Midge	Midge DD (°F)	Midge ADD (°F)	Midge Comment
2022-07-03	81	54	0.00	35	1281	8.2	Fl. L Emrg.	No	27	1308	10% of females emerged
2022-07-04	83	66	0.03	43	1324	8.5		No	35	1343	
2022-07-05	74	65	0.00	38	1362	8.8		No	30	1373	
2022-07-06	85	61	0.09	41	1403	9.1	Boot Swell	No	33	1406	
2022-07-07	70	56	0.08	31	1434	9.3		No	23	1429	
2022-07-08	79	56	0.00	35	1469	9.5		No	27	1456	Peak female emergence
2022-07-09	85	64	0.17	43	1512	9.8		No	35	1491	~ 50% females emerged
2022-07-10	80	59	0.97	38	1550	10.1	Boot Cmplt.	Yes	30	1521	
2022-07-11	77	59	0.00	36	1586	10.3	Head Beg.	Yes	28	1549	

CANOLA - BERTHA ARMYWORM AND DIAMONDBACK MOTH UPDATE

It's still early for scouting for bertha armyworm and diamondback moth based on pheromone trap reports. However, I wanted to get the protocol and E.T. out to you, since last year we were surprised by the large number of diamondback moth larvae in canola fields located in northeast ND.

Bertha armyworm: Larvae are about 1½ inches long and vary from green and brown to velvet black when mature. Larvae should be monitored regularly in canola about two weeks after peak adult trap catch. The cumulative number of moths per trap is used to gauge larval infestation risk level. Field scouting should be conducted when there are more than 900 moths per trap. See table at the right.

Cumulative Number of Moths Per Trap		Larval Infestation Risk Level
From	To	
0	300	**Low** – Infestations are unlikely to be widespread, but fields should be scouted for signs of insects or injury.
300	900	**Uncertain** – Infestations may not be widespread, but fields that were particularly attractive to egg-laying females could be infested. Check your fields.
900	1,200	**Moderate** – Canola fields should be scouted regularly for larvae and evidence of injury.
1,200	1,500+	**High** – Canola fields should be scouted frequently for larvae and evidence of injury.

Source: Manitoba Agriculture, Food and Rural Initiatives, Canada

Bertha armyworm larvae feeding on canola pod (J. Knodel, NDSU Extension)

Check several locations per field. At each location, mark an area of 0.25 square meter (50 cm by 50 cm) and shake the plants to dislodge any larvae that may be on the plants. Count the number of larvae on the ground. Carefully inspect under clumps of soil and leaf litter, where larvae hide during the day. Counts are multiplied by four to determine the average number of larvae per square meter for each field. The current E.T. is yellow highlighted in the table (above) for canola valued at $16.50 per bushel. See ***Bertha armyworm in Canola* E1347**.

Insecticide + Application Cost ($ per ac)	Expected Market Value ($ per bushel)										
	10	11	12	13	14	15	16	17	18	19	20
	Number of larvae per square meter										
7	12	11	10	9	9	8	8	7	7	6	6
8	14	13	11	11	10	9	9	8	8	7	7
9	16	14	13	12	11	10	10	9	9	8	8
10	17	16	14	13	12	11	11	10	10	9	9
15	26	24	22	20	18	17	16	15	14	14	13
20	34	31	29	27	25	23	22	20	19	18	17
25	43	39	36	33	31	29	27	25	24	23	22
30	52	47	43	40	37	34	32	30	29	27	26

Diamondback moth: The newly hatched larva is light green and turns a darker green as it matures and is about ½ inch long.

Scout for larvae in the field by pulling all plants from a 1-square-foot area. Beat collected plants onto a clean surface or into a white bucket and then count the number of larvae dislodged from plants. Larvae often will dangle from canola plants on a silk thread. Repeat this procedure in at least five locations in the field to obtain an average of the number of larvae per square foot. See ***Diamondback moth in Canola E1346***.

Diamondback moth larvae and leaf injury (Anitha Chirumamilla, NDSU Extension)

Economic Thresholds for Diamondback Moth Larvae

- **Flowering = 10 to 15 larvae per square foot**
- **Pod stages = 20 to 30 larvae per square foot**

APHID UPDATE

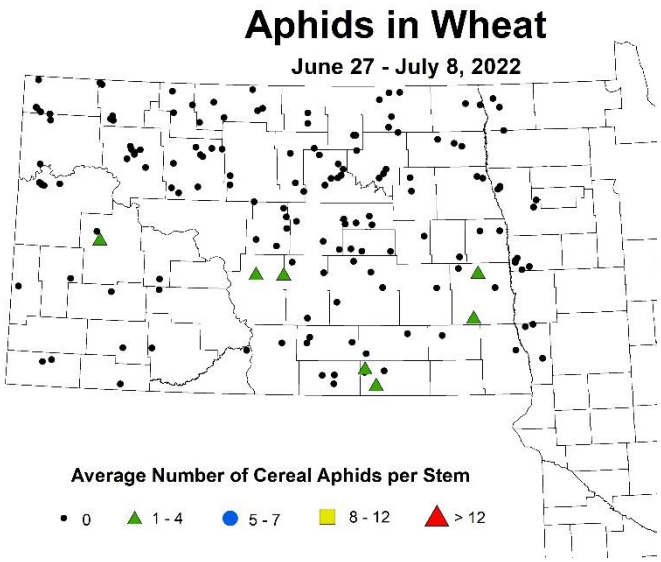
The recent severe thunderstorms and hot temperatures above 90°F have been fairly effective in keeping most aphid populations low in ND so far. As crops get bigger and have more canopy closure, it will be easier for aphids to hide and survive in extreme weather conditions.

Cereal aphid numbers are still low in most areas of ND based on the IPM Crop Survey. A few calls of higher numbers of cereal aphids have come from the Leeds and Devils Lake areas.

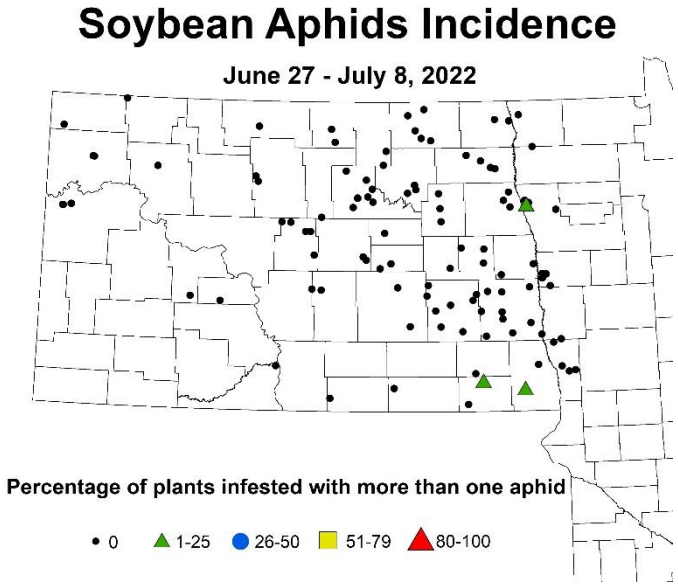
Field scouting should begin at stem elongation and continue up to the early dough stage of wheat. To protect small grains from yield loss due to aphid feeding, we recommend the following growth stage thresholds:

Economic Thresholds for Cereal Aphids in Wheat, Barley or Oats

- vegetative through head emergence - 4 aphids per stem
- complete heading through the end of anthesis - 4-7 aphids per stem
- end of anthesis through medium milk - 8-12 aphids per stem
- medium milk through early dough - >12 aphids per stem



Soybean aphid numbers also are low and they are just being detected the last couple of weeks in the IPM Crop Survey, especially in the Red River Valley area. It is still early for soybean aphids, so be sure not to spray any insecticide early as you will kill the many beneficials insects feeding on aphids (lady beetles, syrphid fly larvae, parasitic wasps and more) and also cause secondary pests like spider mites to surge.



What to spray for aphid control in wheat, barley and oats and soybeans now that Lorsban and Lorsban premixes are gone? We recommend trying the newer insecticides (in red letters in tables) that are specific to piercing-sucking insect pests like aphids. **Pyrethroid insecticides have been overused for many different insect pests like grasshoppers, and continued overuse, the 'pesticide treadmill,' will eventually cause the development of insecticide resistance.**

Wheat, Barley and Oats - Alternatives to Chlorpyrifos (Lorsban and generics) – Grain aphids							
IRAC Class	Example Trade Name	Active Ingredient(s)	PHI	Rate Range (oz/acre)		Cost ($/acre)	
				Low	High	Low	High
1B	Dimate 4E	dimethoate	35 days	8	12	$ 3.04	$ 4.56
1B	Malathion 5	malathion	7 days	24	25.6	$ 8.64	$ 9.22
3A	Fastac CS	alpha-cypermethrin	14 days	3.2	3.8	$ 4.38	$ 5.21
3A	Baythroid XL	beta-cyfluthrin	30 days	1.8	2.4	$ 4.63	$ 6.17
3A	Tombstone Helios	cyfluthrin	30 days	1.8	2.4	$ 4.23	$ 5.64
3A	Warrior II	lambda-cyhalothrin	30 days	1.28	1.92	$ 3.79	$ 5.68
3A	Silencer VXN	lambda-cyhalothrin	30 days	2.56	3.84	$ 1.77	$ 2.65
3A	Mustang Maxx	zeta-cypermethrin	14 days	3.2	4	$ 4.61	$ 5.76
3A, 28	Besiege	lambda-cyhalothrin + chlorantraniliprole	30 days	6	10	$15.12	$25.20
4C	Transform WG	sulfoxaflor	14 days	0.75	1.5	$ 6.06	$12.12
4D	Sivanto Prime	flupyradifurone	21 days	7	14	$18.27	$36.54

Soybeans - Alternatives to Chlorpyrifos (Lorsban and generics) – Soybean aphids							
IRAC Class	Trade Name	Active Ingredient(s)	PHI	Rate Range (oz/acre		Cost ($/acre)	
				Low	High	Low	High
1A	Lannate LV	methomyl	14 days	8	16	$ 3.92	$ 7.84
1B	Acephate 97 UP	acephate	14 days	12	16	$ 5.88	$ 7.84
3A	Fastac CS	alpha-cypermethrin	21 days	2.8	3.8	$ 3.84	$ 5.21
3A	Baythroid XL	beta-cyfluthrin	21 days	2	2.8	$ 5.14	$ 7.20
3A	Brigade 2EC	bifenthrin	18 days	2.1	6.4	$ 2.52	$ 7.68
3A	Tombstone Helios	cyfluthrin	45 days	2	2.8	$ 4.70	$ 6.58
3A	Delta Gold	deltamethrin	21 days	1.5	2.4		
3A	Asana XL	esfenvalerate	21 days	5.8	9.6	$ 3.31	$ 5.47
3A	Warrior II	lambda-cyhalothrin	30 days	0.96	1.6	$ 2.84	$ 4.74
3A	Silencer VXN	lambda-cyhalothrin	30 days	1.92	3.2	$ 1.32	$ 2.21
3A	Mustang Maxx	zeta-cypermethrin	21 days	2.8	4	$ 4.03	$ 5.76
4A	Belay	clothianidin	21 days	3	6	$ 7.62	$15.24
4A	Nuprid 4F Max	imidacloprid	21 days	1.5	1.5	$ 1.50	$ 1.50
4D	Sivanto Prime	flupyradifurone	21 days	7	14	$18.27	$36.54
9D	Sefina	afidopyropen	7 days	3	3	$ 6.54	$ 6.54
4C	Transform WG	sulfoxaflor	7 days	0.75	1	$ 6.06	$ 8.08

Premixes IRAC Class	Trade Name	Active Ingredient(s)	PHI	Rate Range (oz/acre		Cost ($/acre)	
				Low	High	Low	High
28, 3A	Besiege	chlorantraniliprole + lambda-cyhalothrin	30 days	5	8	$12.60	$20.16
3A, 28	Elevest	bifenthrin + chlorantraniliprole	18 days	4.8	9.6	$13.01	$26.02
3A, 3A	Hero	bifenthrin + zeta-cypermethrin	21 days	4	10.3	$ 7.92	$20.39
3A, 4A	Leverage 360	beta-cyfluthrin + imidacloprid	21 days	2.8	2.8	$ 5.96	$ 5.96
3A, 4A	Brigadier	bifenthrin + imidacloprid	21 days	3.8	6.1	$ 6.16	$ 9.88
3A, 4A	Skyraider	bifenthrin + imidacloprid	21 days	2.1	6	$ 3.02	$ 8.64
3A, 4A	Endigo ZC	lambda-cyhalothrin + thiamethoxam	30 days	2.5	4	$ 4.80	$ 7.68
3A, 4C	Ridgeback	bifenthrin + sulfoxaflor	18 days	6.9	13.8		
9D, 3A	Renestra	afidopyropen + alpha-cypermethrin	21 days	6.8	6.8	$ 5.58	$ 5.58

Janet J. Knodel
Extension Entomologist

EUROPEAN CORN BORER TRAPPING UPDATE

European corn borer (ECB) Z-race moths (univoltine) were detected at 9 of the 13 of trap sites this last week (catches were from July 6-12). ECB E-race (bivoltine) moths were not found in traps last week at any of the sites (see Table 1). ECB-Z peaked two weeks ago in Shenford and Sheldon, Ransom County, and decreasing trap counts were observed this week at these two locations. We also detected the first Z-race ECB moth at 4 trap sites in east central counties (field near Casselton, Grandin, Cooperstown, and Luverne). Corn crop stages were V7 to V11.

Table 1. 2022 pheromone trap catches for European corn borer (ECB) moths in corn, ND

Area	County	Nearest town	ECB Z-race moths					ECB E-race moths				
			June 15-21	June 22-28	June 29-July 5	July 6-12	Total trap	June 15-21	June 22-28	June 29-July 5	July 6-12	Total trap
EC	Barnes	Cuba	0	0	0	0	0	0	0	0	0	0
EC	Cass	Casselton	0	0	0	1	1	0	0	0	0	0
EC	Cass	Rush River	0	0	1	0	1	0	0	0	0	0
EC	Cass	Grandin	....	....	0	1	1	....	....	0	0	0
EC	Griggs	Cooperstown	0	0	0	2	2	0	0	0	0	0
EC	Steele	Finley	0	0	4	10	14	0	0	0	0	0
EC	Steele	Luverne	0	0	0	2	2	0	0	0	0	0
NC	Ward	Minot	0	0	0	0	0	0	0	0	0	0
SE	Sargent	Gwinner	0	0	2	4	6	0	0	1	0	1
SE	Ransom	Shenford	0	6	49	15	70	0	0	0	0	0
SE	Ransom	Sheldon	0	8	53	28	89	3	0	0	0	3
SE	Richland	Lidgerwood	0	0	0	0	0	0	0	0	0	0
SE	Richland	Antelope	0	0	4	1	5	0	0	0	0	0
		Total moths	**0**	**14**	**113**	**64**	**191**	**3**	**0**	**1**	**0**	**4**

Veronica Calles-Torrez
Post-doctoral Scientist

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plant pathology

AGRI TIN AND SUPER TIN RECEIVED SPECIAL LOCAL NEEDS LABEL FOR USE ON SUGARBEET IN MINNESOTA

Agri Tin Flowable (SLN# MN-220007) and Super Tin 4L (SLN# MN-22008) received 24(c) (Special Local Needs label) from Minnesota Department of Agriculture so that they now can be used on sugarbeet for control of *Cercospora beticola* with a pre-harvest interval (PHI) of 7-days. It will be useful for growers to have the option of using triphenyltin hydroxide present in both products mixed with another product such as Proline (7-day PHI) or copper based (copper oxychloride, copper hydroxide, copper sulfate) fungicides (0-day PHI) towards the end of the growing season (after September 15) when *C. beticola* population and disease severity are high and damaging under favorable environmental conditions.
We wish to thank the Minnesota Department of Agriculture for approving the use of triphenyltin hydroxide products towards the end of the growing season since this active ingredient is the mainstay of our fungicide program in effectively controlling Cercospora leaf spot. Both of these products are also approved for use with a 7-day PHI in North Dakota.

Figure 1. *Cercospora beticola* kills the mature and productive leaves resulting in re-growth of new leaves. Ineffectice control of the pathogen results in reduced tonnage, significantly lower sugar concentration and lower recoverable sucrose, with higher processing costs.

Figure 2. Sugarbeet field with multiple fungicide applications did not provide effective CLS control because of fungicide resistance.

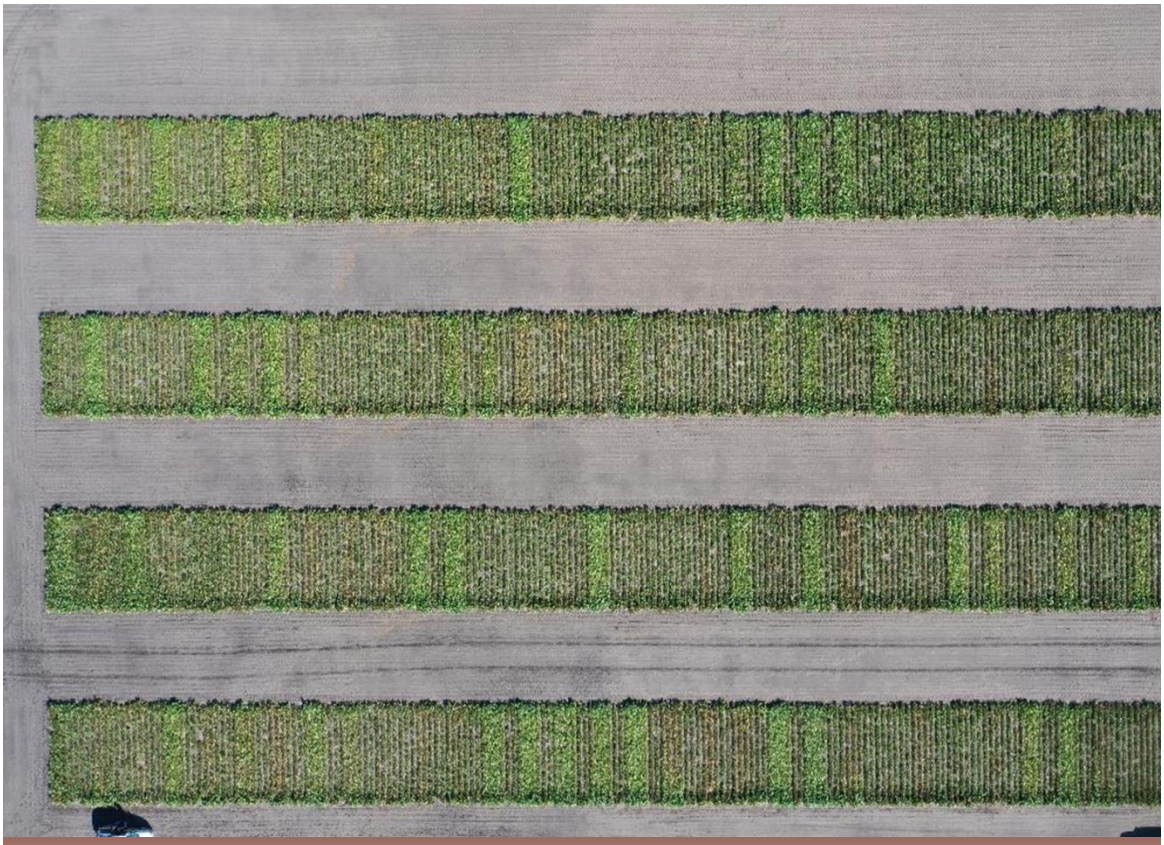

Figure 3. Sugarbeet plots sprayed with 31 individual and fungicide mixtures showed that only certain fungicide mixtures (9) provided effective season long control of CLS in 2021 near Foxhome, MN.

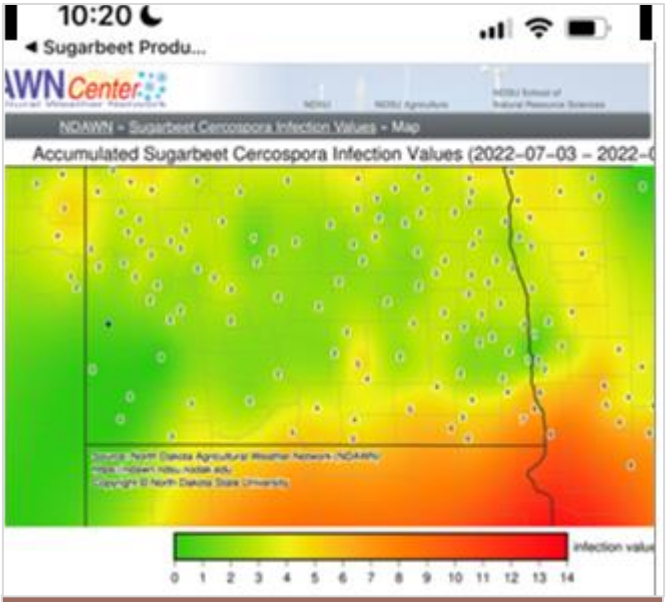

Figure 4. North Dakota Weather Network illustrating the accumulated Cercospora infection values for July 3 and 4, with favorable conditions for infection in Mooreton and Campbell (values of 7 or greater)

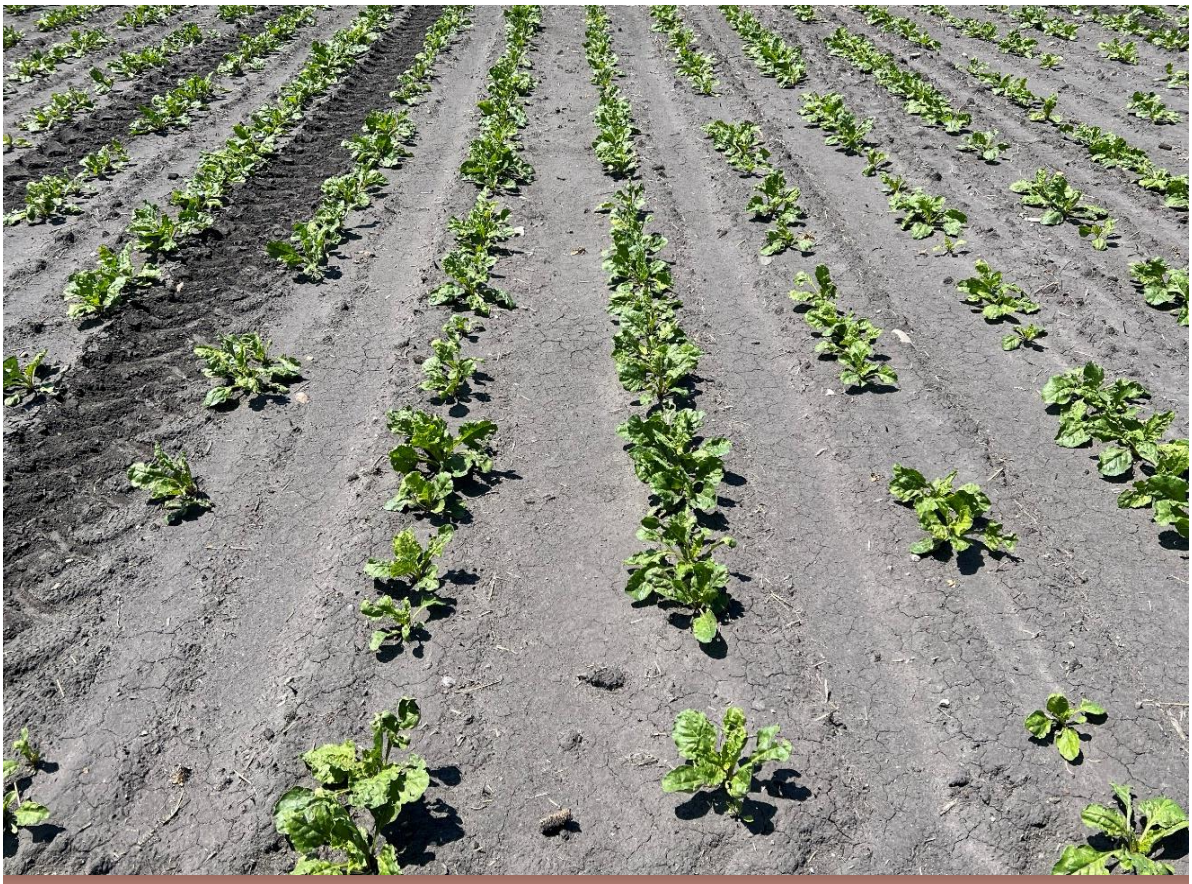

Figure 5. Sugarbeet planted on May 27, 2022 near Foxhome, MN

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FUSARIUM HEAD BLIGHT (SCAB) RISK AND FUNGICIDE REMINDERS

This past weekend's weather for most of the state presented conditions of high humidity, rain, and prolonged dews. These three factors greatly contribute to scab risk and now an elevated scab risk exists for small grains (Figure 1). According to the NDSU Small Grain Disease Forecasting Model, the greatest scab risk exists for spring wheat varieties that are rated as very susceptible or susceptible to Fusarium head blight. This includes hard red spring wheat and durum varieties rated 6 or higher, however there is still moderate risk in some areas for the spring wheat varieties that are rated as moderately susceptible and moderately resistant varieties (rated 5 or less).

When looking at the immediate forecast, high humidity levels will be sporadic amongst the days, yet prolonged morning dews are still likely to occur at least a couple times this week. Given the weekend's weather and the forecast, scab risk will likely remain elevated for this week.

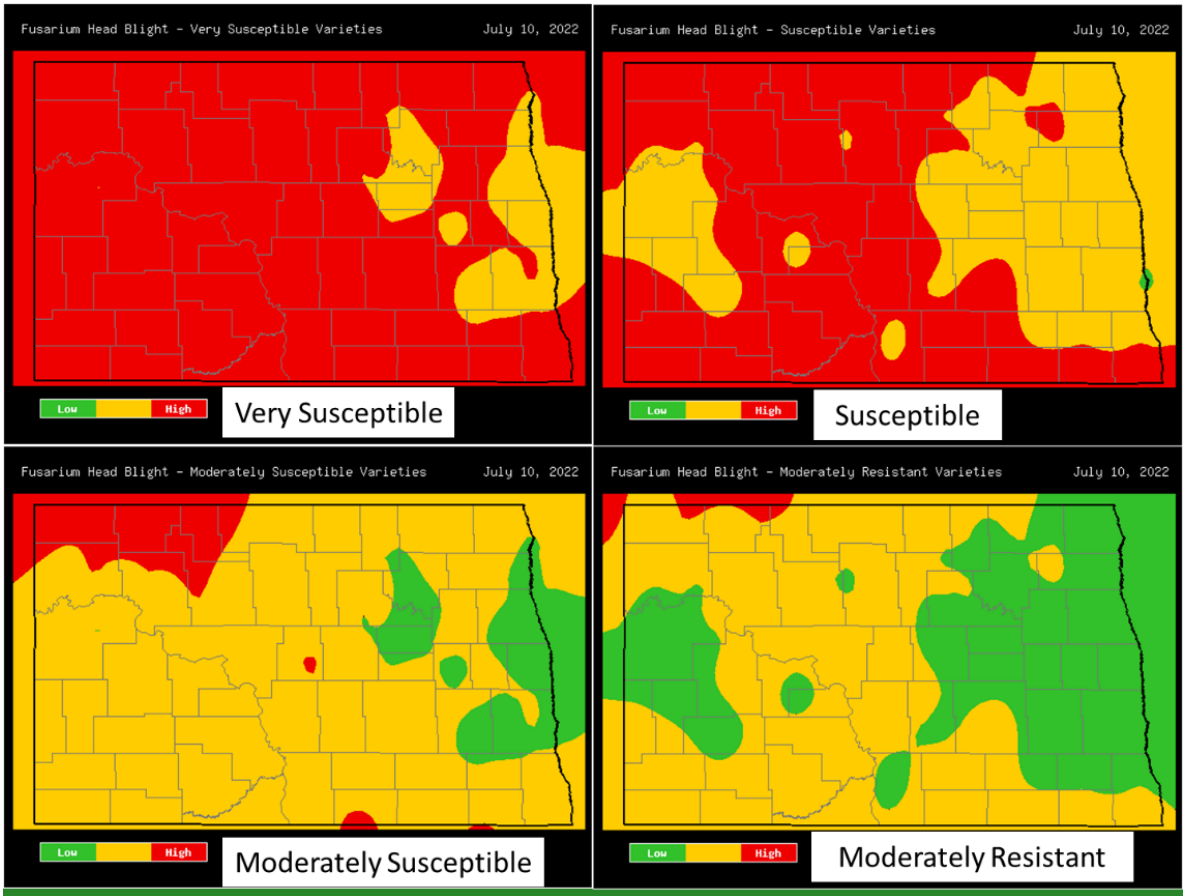

Figure 1. Fusarium head blight (scab) risk predicted by the NDSU Small Grain Disease Forecasting Model for very susceptible, susceptible, moderately susceptible and moderately resistant varieties on July 10. Red indicates high risk, yellow indicates moderate risk, and green indicates low risk.

Fungicide efficacy

There are several labeled fungicides that provide "good" scab suppression of scab. These include Caramba®, Proline®, Prosaro®, Prosaro Pro®, Miravis Ace®, and Sphaerex®. Fungicides with the solo active ingredient of tebuconazole are rated as "fair". The active ingredient propiconazole has "poor" efficacy on scab. To put this in terms of percentage reduction of scab and deoxynivalenol (DON/VOM), "good" fungicides provide about 45-60% suppression, "fair" fungicide may only offer 20-25%, and "poor" fungicides provide only about 10% suppression. Understand that tank mixing fungicides does not mean that the efficacy of the tank mix is the sum of both products. In other words, adding tebuconazole to Caramba does not increase the level suppression of scab to 80% or more.

Lodged small grain and fungicide effectiveness

The weekend storms unfortunately caused some lodging in small grain fields. This raises the question if and how to spray fungicides on lodged grain. Small grains, including spring wheat, generally adhere to the 'three strikes and you're

out' rule. Once the grain lodges - especially if it lodges immediately after stem elongation - individual stems will erect itself by pumping water in the cells that are on the shaded side of the nodes. After two lodging events or as the plant approaches to physiological maturity, the cells in those nodes lose the ability to stretch any further and as the grain will remain lodged. Therefore, wait to spray small grains until they partially straighten up. Fungicides do not move great distances on plant tissue and coverage of the spike is key to suppressing scab and DON. Luckily, recent studies have shown that the window of application is a bit wider than previously thought. While the optimum timing remains Feekes 10.5 for barley and Feekes 10.51 for spring wheat, the labeled fungicides rated good for scab can be applied up to 7 days after the optimum timing.

Andrew Friskop
Extension Plant Pathology, Cereal Crops

Jochum Wiersma
Extension Agronomist, Small Grains, UMN

OPTIMIZING FUNGICIDE TIMING AND DROPLET SIZE FOR MANAGEMENT OF WHITE MOLD IN SOYBEANS

Parts of central and eastern North Dakota have been experiencing several days each week with daytime highs in the lower 80°F range and have been receiving recurrent rainfall. If this weather continues through soybean bloom, risk of white mold will be elevated in fields with a history of the disease.

If weather favorable for white mold continues into soybean bloom, fungicide efficacy against white mold is optimized by applying as soon 100% of plants reach the R2 growth stage unless the canopy closes earlier **(Figure 1)**. If the canopy closes at the R1 or the early R2 growth stage, fungicides should be applied at or shortly before canopy closure. If the canopy is open at the R2 growth stage and the weather favors white mold, fungicides should be applied when 100% of plants reach R2 even if significant ground is still showing between rows. Once soybeans reach the R2 growth stage, soybeans have large numbers of dead blossoms and white mold can develop even when the canopy is still open.

Soybean growth stage and soybean maturity are important determinants of susceptibility to white mold. The growth stage at which soybeans are most susceptible to white mold is R2 to R4. Soybeans of maturity 0.3 or 0.4 and higher are at greatest risk of the disease, with susceptibility to white mold generally increasing as maturity length increases.

Comparative fungicide efficacy data for fungicides commonly used for white mold management in soybeans can be found on the NDSU Carrington Research Extension Center website by searching for 'NDSU Carrington plant pathology' or by navigating to https://www.ndsu.edu/agriculture/ag-hub/research-extension-centers-recs/carrington-rec/research/plant-pathology.

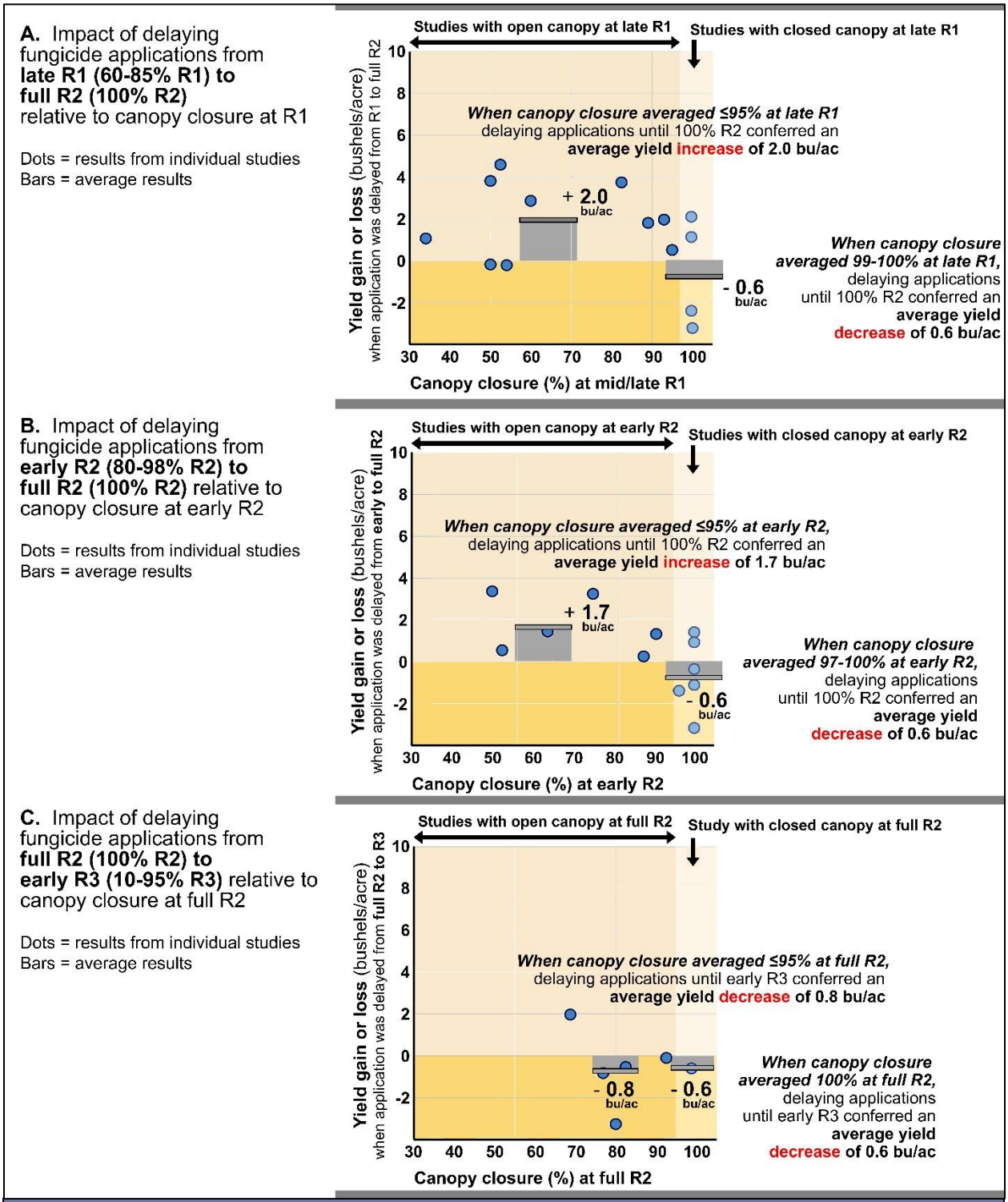

Figure 1. Impact of applying fungicides targeting white mold at R1, R2 or R3 relative to soybean canopy closure. Shown is the combined analysis of 21 field trials conducted from 2014 to 2016 across multiple locations in North Dakota.

The yield response to fungicide applications targeting white mold in soybeans can be nearly doubled when droplet size is calibrated relative to nozzle manufacturer and soybean canopy closure.

From 2017 to 2020, the plant pathology research program in Carrington, collaborating with agronomists at the NDSU Robert Titus Research Farm in Oakes, quantified the impact of fungicide spray droplet size on management of white mold in soybeans. Fungicide applications were made with a tractor-mounted R&D sprayer equipped with a pulse-width modulation system from Capstan AG. Fungicides were applied in 15 gal/ac spray volume at 4.0 mph, 6.0 mph, 6.7 mph, 8.9 mph, or 10.5 mph, depending on the study with TeeJet extended-range flat-fan nozzles or Wilger Combo-jet flat-fan nozzles and application pressures selected to achieve the target droplet size. Pulse width was modified as needed to maintain a constant spray volume and constant driving speed across nozzles differing in output. Testing was conducted on multiple soybean varieties differing in canopy architecture, with a single application of the fungicide Endura (5.5 or 8.0 oz/ac) applied at the R2 growth stage.

In applications made with TeeJet extended-range flat-fan nozzles (**Figures 2 and 3**), fine to medium droplets optimized white mold management when the canopy was very open (average < 80% closure when fungicides were applied). Medium droplets were optimal when the canopy was open (average 80-89% closure), and coarse droplets were optimal when the canopy was at or near closure.

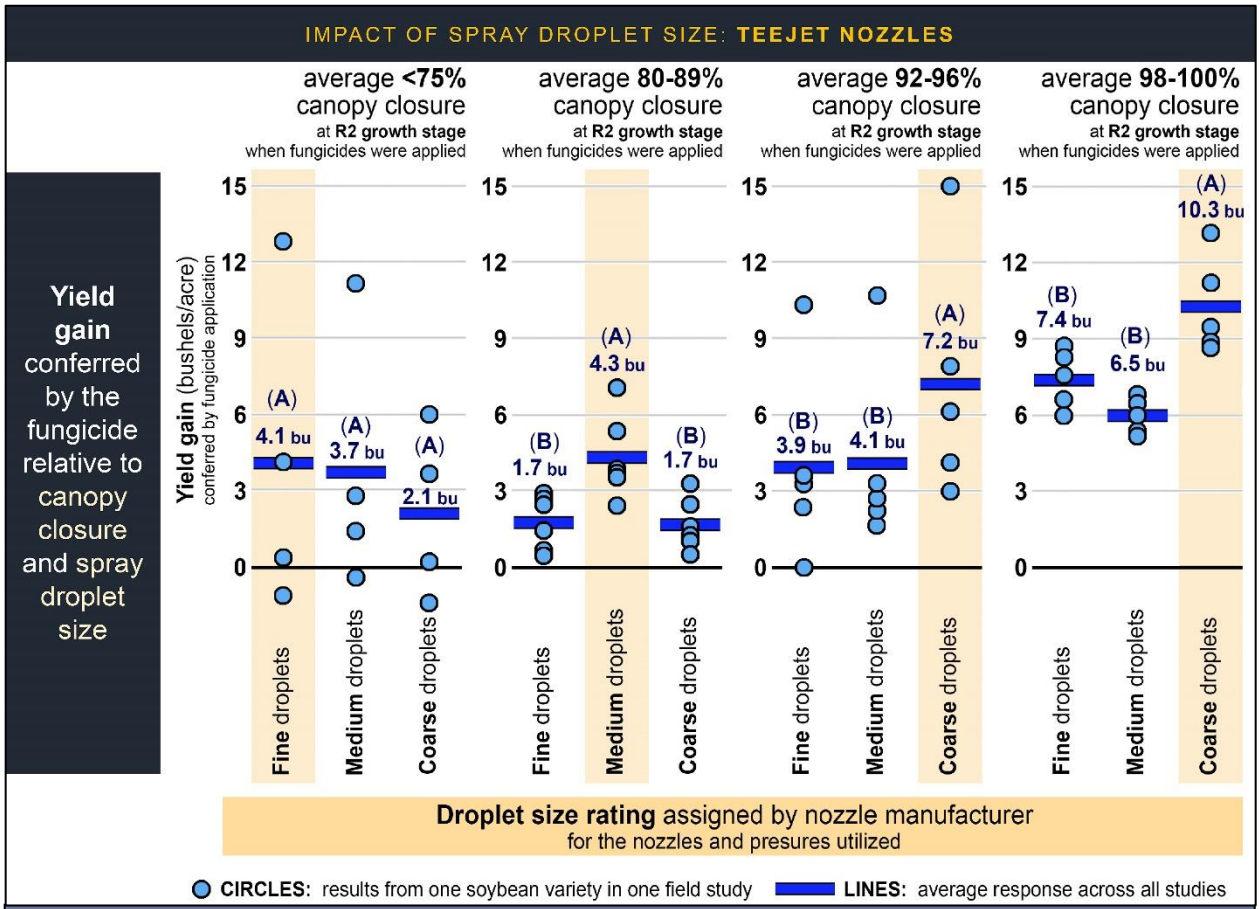

Figure 2. Impact of spray droplet size and soybean canopy closure on efficacy of the fungicide Endura applied once at the R2 growth stage with TeeJet extended-range flat-fan nozzles. Pulse width was modified as needed to maintain a 15 gal/ac spray volume and 10.5 mph (4 studies), 8.9 mph (8 studies), 6.7 mph (5 studies), 6.0 mph (2 studies) or 4.0 mph (1 study) driving speed. Treatment averages followed by different letters are significantly different (P < 0.05).

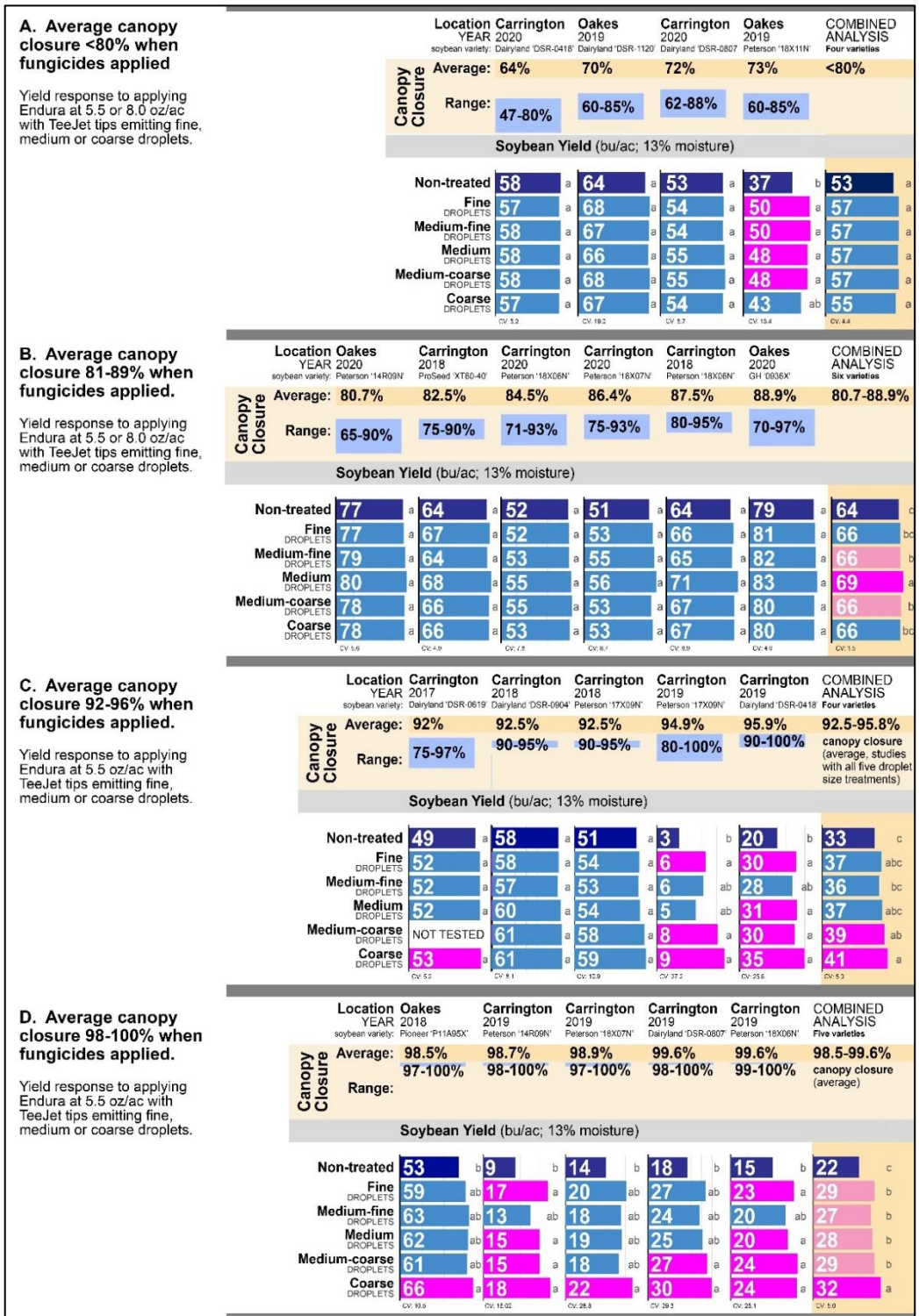

Figure 3. Impact of spray droplet size and soybean canopy closure on efficacy of the fungicide Endura applied once at the R2 growth stage with TeeJet extended-range flat-fan nozzles. Pulse width was modified as needed to maintain a 15 gal/ac spray volume and 10.5 mph (4 studies), 8.9 mph (8 studies), 6.7 mph (5 studies), 6.0 mph (2 studies) or 4.0 mph (1 study) driving speed. Treatment averages followed by different letters are significantly different (P < 0.05).

With Wilger Combo-Jet flat-fan nozzles **(Figures 4 and 5),** coarse droplets were optimal when the canopy was open, and very coarse droplets were optimal when the canopy was at or near closure.

The droplet size spectrum considered 'fine', 'medium', 'coarse', etc. differs by nozzle manufacturer. For white mold management in soybeans, droplets considered 'medium' by TeeJet performed similarly to droplets considered 'coarse' by Wilger, and droplets considered 'coarse' by TeeJet performed similarly to droplets considered 'very coarse' by Wilger. For both manufacturers, the droplet size that optimizes white mold management increased as soybean canopy closure increases. Smaller droplets optimize fungicide coverage but lack the velocity to penetrate a soybean canopy that is at or near closure.

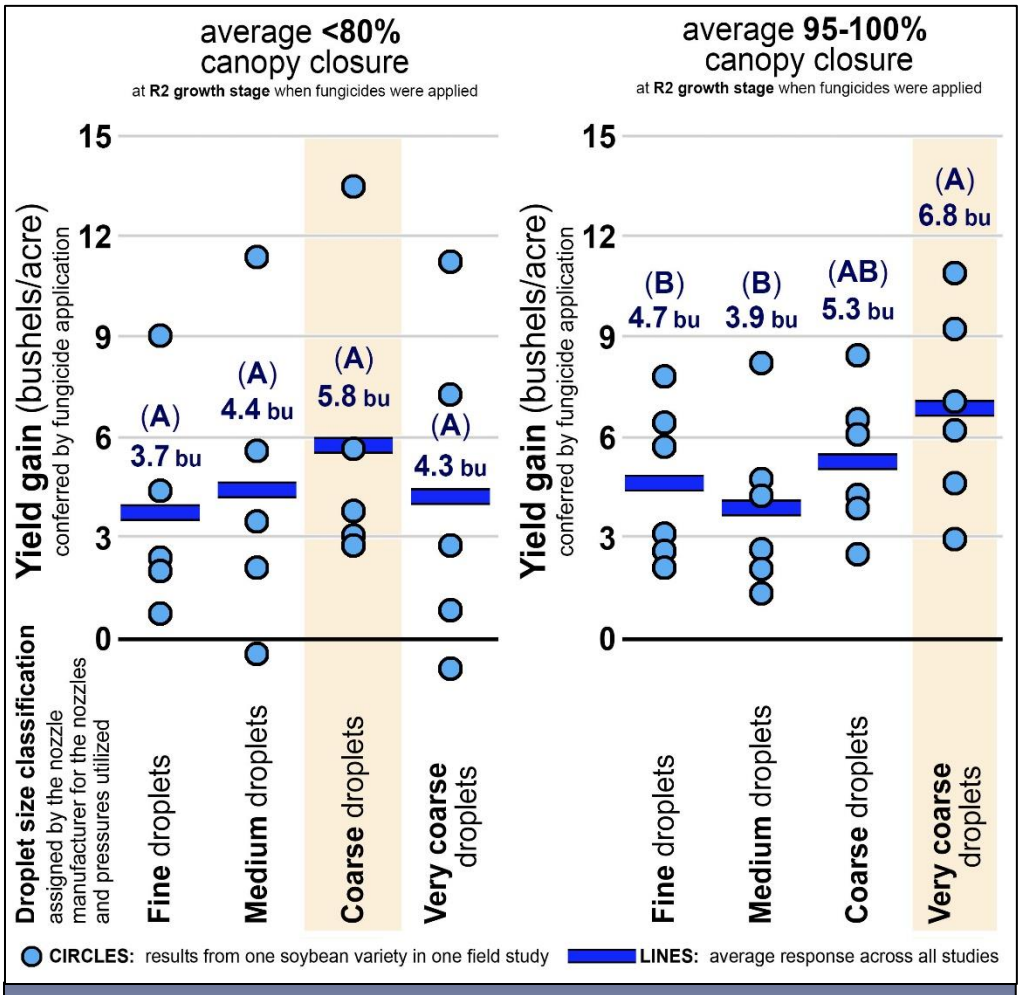

FIGURE 4. Soybean yield response under white mold pressure to a single application of the fungicide Endura (5. oz/ac) applied at the R2 growth stage with Wilger Combo-Jet flat-fan nozzles emitting fine, medium, coarse or very coarse droplets. Letters denote statistical separation (P < 0.05)

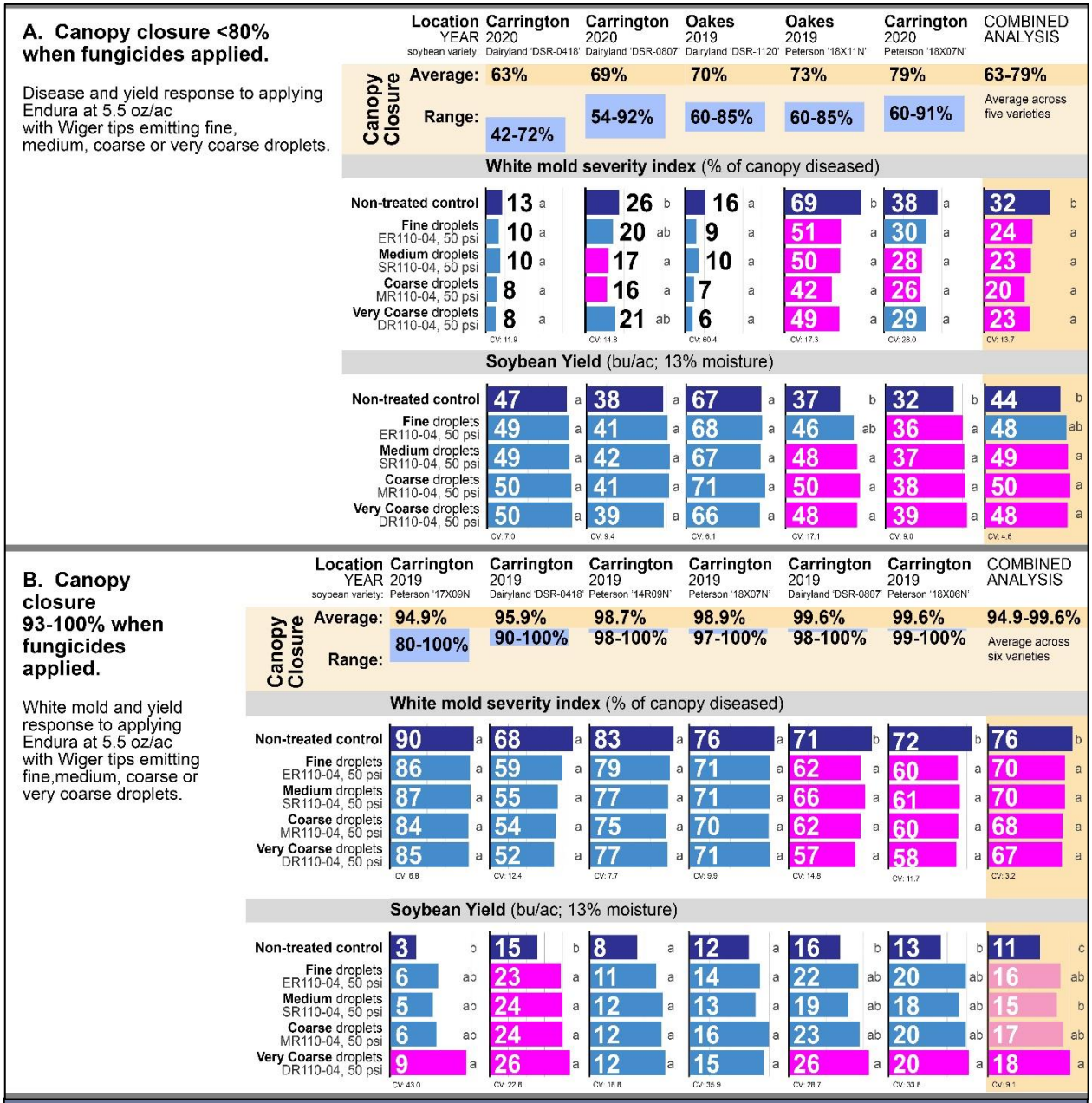

Figure 5. Impact of spray droplet size on efficacy of the fungicide Endura (5.5 oz/ac) applied once at the R2 growth stage to soybeans with an open canopy using Wilger Combo-Jet flat-fan nozzles. Pulse width was modified as needed to maintain a 15 gal/ac spray volume and 8.9 mph (8 studies) or 6.0 mph (3 studies) driving speed. Treatment averages followed by different letters are significantly different (P < 0.05).

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plant science

CANOLA FLOWERING

The beginning of canola flowering is an important crop stage for making decisions about whether or not to use a fungicide application against sclerotinia. For localized sclerotinia risk see the most current risk map. To estimate the canola growth stage in a field use the NDAWN growth stages application.

Flowering canola

When canola is flowering, heat blasting and or flower abortion is a possibility. This can vary from field to field and is very dependent on time of flowering, soil moisture and humidity during the hot periods. Usually in this situation one would see no or limited pod growth and thus no seed. It will usually be in patches on the main stem and branches as related to time of flowering and the heat stress. With good soil moisture usually canola flower abortion will be minimized to some extent.

High temperatures during flowering shorten the time the flower is receptive to pollen, as well as the duration of pollen release and its viability. This can decrease the number of pods which develop and the number of seeds per pod, resulting in lower yields. Once pods are formed, canola is more tolerant than at flowering to high temperatures. Cool night temperatures at this time also help the plant recover. High temperatures at flowering will hasten the plant's development, reducing the time from flowering to maturity. The seed oil content is highest when seeds mature under lower temperatures (50 to 70 F). High temperatures during seed maturation result in reduced oil content.

SOYBEAN FLOWERING

Typically, after about six trifoliate leaves have been produced, the soybean plant begins the reproductive period. Some herbicide labels specify a reproductive stage after which the product cannot be used. R1 Stage: beginning flowering, at least one flower appears on the plant on any node on the main stem. R2 Stage: full Flowering. At this stage an open flower is visible at one of the two uppermost nodes on the main stem.

Soybean plant with flowers.

The soybean flowers are self-pollinated; that is, the flower fertilizes itself, and insects are not required to carry pollen from one flower to another. From 3 to 15 flower buds develop at each node of the stem.

Flowering begins lower on the stem. Upper nodes will not flower until later. The flowers of soybean are very small (1/4 inch) and are white, pink, or purple. Only about 50 to 80% of the total flowers actually produce pods. One or two weeks after the first flowers are produced, the first seed pods appear. Most of the pods are set within the following three weeks. Two to three and sometimes four seeds are produced per pod. The seed-filling period is very critical to yield. If environmental conditions are adverse (drought, hail, or disease), seed-fill will be restricted, and yields will be cut severely.

A team consisting of soybean specialists from across the U.S. focuses on leveraging local expertise to provide national soybean best management practices. The team is posting 1-3 videos from various states (including ND) each week on Twitter. The account for the team is @SoybeanScience1.

Hans Kandel
Extension Agronomist Broadleaf Crops

MANY SMALL GRAIN FIELDS ARE IN THE FUNGICIDE APPLICATION WINDOW FOR SCAB NOW

Growth stages of small grains are variable throughout the region due to large differences in planting dates. However, most fields are at flag leaf to early grain fill with many heading to flowering. Growers are advised to scout fields for flowering by checking for the presence of anthers (male flowers) on wheat and durum heads and be ready to make fungicide applications if local conditions favor scab (Fusarium Head Blight) infection and development. Prolonged periods of leaf wetness caused by high humidity, rain showers, or persistent dew combined with warm (75-85°F)

temperatures favor scab infection. Be aware of your local conditions when making your decisions, as the NDAWN Fusarium Head Blight and National Fusarium Risk Tool models cannot account for highly localized rainfall events. Also, check the scab susceptibility of your wheat varieties by consulting the NDSU Variety Trial Results bulletin or with your seed company representative.

The predicted higher temperatures of later this week and next will reduce the risk of scab infection, but again, with cooler overnight temperatures, smaller windows conducive to scab infection are likely to persist, especially if your fields experience long periods of wetness in the canopy.

Clair Keene
Extension Agronomist Small Grains and Corn

CONTROLLING ESCAPE WATERHEMP IN SUGARBEET

Sugarbeet rows are closing or have closed in many Producer fields. I anticipate rows will close in the remaining sugarbeet fields in the next 7 to 14 days. What if you have escape waterhemp in fields and want to consider control options before row closure. The following are some options for waterhemp control.

Inter-row Cultivation
Waterhemp has prompted producers to re-integrate inter-row cultivation into weed management programs, as no currently registered herbicides can control glyphosate-resistant waterhemp POST in sugarbeet. Producers frequently ask if cultivation will affect the herbicide barrier and stimulate germination of a new flush of waterhemp.

Inter-row cultivation improved waterhemp control 14 and 28 d after treatment in experiments conducted in Minnesota and North Dakota from 2017 to 2019. Waterhemp response to cultivation was dependent on crop canopy and rainfall after cultivation. Cultivation had minimal effect on waterhemp density in three environments, but at one environment, near Galchutt, ND in 2019, waterhemp density increased 600% and 196%, 14 and 28 d after treatment, respectively. Climate data indicated that in 2019 Galchutt, ND received over 4-inch of rainfall in the 14 d following cultivation and had an open crop canopy that probably contributed to further weed emergence.

Liberty Applied through the Hooded Sprayer
Selective and nonselective herbicides applied through hooded sprayers are used in cotton production to control weeds between rows. The hood protects cotton plants from herbicides that may cause growth reduction injury. The practicality and value of a hooded sprayer was evaluated in sugarbeet as herbicide-resistance continues to increase in species such as waterhemp and Palmer amaranth.

Liberty at 32 fl oz/A plus ammonium sulfate (AMS) applied through the Redball™ 915 hooded sprayer (24c local needs label) improved 4- and 6-inch waterhemp control as compared with repeat glyphosate applications at 28 fl oz/A / 28 fl oz/A plus NIS and AMS. Growth reduction injury was negligible from Liberty applied at the

6-lf sugarbeet stage or greater and Liberty did not reduce root yield, sucrose content or recoverable sucrose as compared to repeat glyphosate application.

Ultra Blazer at 6-lf Sugarbeet Stage

EPA approved our request for a Section 18 Emergency Exemption for use of Ultra Blazer for postemergence control of glyphosate-resistant waterhemp on sugarbeet in Minnesota and North Dakota in 2022. One Ultra Blazer (UPL, King of Prussia, PA) application per season can be used at a rate of 16 fl oz/A (0.25 lb active ingredient) on sugarbeet at the 6-lf stage or greater. Ultra Blazer should be applied with a non-ionic surfactant at 0.125% v/v in 15 to 20 gallons of water carrier since coverage is essential for control. Target waterhemp less than 4-inch tall. Ultra Blazer can only be tank-mixed with glyphosate and ammonium sulfate (AMS).

Sugarbeet injury and waterhemp control from Ultra Blazer are dependent on spray nozzles, spray coverage, environmental conditions, and waterhemp size. We have observed improved waterhemp control from applications at 20 gpa as compared to 15 gpa. We also have observed greater injury when glyphosate alone or glyphosate and adjuvants are mixed with Ultra Blazer as compared to Ultra Blazer with non-ionic surfactant (Table).

Table. Sugarbeet growth reduction in response to herbicide treatment, locations in Minnesota in 2022

Treatment	Crookston	Hendrum	L. Lillian	Murdock	Nashua
	%	%	%	%	%
Ultra Blazer (UB) + non-ionic surfactant (NIS)	16	15	13	18	39
UB + NIS/UB + NIS	23	15	24	30	46
UB + PowerMax3 (PM3) + ammonium sulfate (AMS)	49	42	38	49	62
UB+ PM3 + NIS + AMS	43	45	36	51	58
PM+NIS+AMS/PM+NIS+AMS	0	0	3	3	4

Electric Discharge Systems

Electric discharge weeding operates by forcing an electrical current through a plant stem. Once contacted, electricity heats cellular fluids and bursts vascular bundles. Grasses or highly branched plants like kochia require greater voltage, slower operation speed and/or an extra pass to effectively kill weeds. The EDS system is commercially marketed as the 'Weed Zapper™' and manufactured in Sedalia, Missouri. The Weed Zapper is a modern-day prototype of the original EDS the 'Lasco Lightening Weeder' developed in Grand Forks County in 1979. The Weed Zapper features more wattage and major safety improvements for the operator compared to the original EDS.

The Weed Zapper™ provided greater than 80% waterhemp (primary stem) control, 14 days after treatment (DAT), with experiments conducted by Extension Sugarbeet Weed Control in 2020. Kochia (highly branched stem) control 14 DAT was less. Operating speed did not influence waterhemp control (Univ of Missouri research). One pass across the field controlled waterhemp in an open canopy but multiple passes provided better control in a dense canopy.

Tom Peters
Extension Sugarbeet Agronomist
NDSU & U of MN

AROUND THE STATE

NORTH CENTRAL ND

Severe weather impacted parts of the north central region over the last week. Hotter temperatures appear to help anchor a drier weather pattern according to area forecasts for the next week. At the NCREC, 1.33" of rain was observed since last Tuesday (July 5th). The following are precipitation observations across the area as noted by local NDAWN stations from July 5th through July 12th: Bottineau: 0.98"; Garrison: 0.53"; Karlsruhe: 1.55"; Mohall: 0.98"; Plaza: 1.02"; and Rugby: 1.31". Bare soil temperatures were being observed at 72°F on the morning of July 12th.

Calls into the Crop Protection Office are beginning to slow from an entomology standpoint. In terms of insects, most calls remain centered on grasshoppers. Based on those calls, field edge applications are still being utilized. On the plant pathology side, growers are not finding a lot of disease, however, some growers are making fungicide applications to reduce chances of pathogens in the field. Many of these calls are focused on small grains and pulses. Over the last few days, the small grains forecast has hinted towards favorable environmental conditions for disease. Damp conditions and dew have been observed over the last week with cloudy conditions allowing for moisture to linger on plants through about mid-morning. However, a weather pattern change may reduce the conditions for pathogen development. Overall, scouting will be key over the next week for both plant pathology and entomology concerns in the area.

Next week, the NCREC is excited to welcome members of the agricultural community to the North Central Research Extension Center for our annual field day event. Activities begin on Wednesday, July 20th at 8:30 am with a pest clinic, a hay judging contest, and a plant root demonstration. The field tour begins at 9 am with the following speakers and topics:

- NDSU hard red spring wheat breeding – Andrew Green, NDSU spring wheat breeder
- Weed control updates – Brian Jenks, NCREC weed scientist; Joe Ikley, NDSU Extension weed specialist
- Cool/warm season mixtures for forage production – James Rogers, Extension forage crop production specialist at the NCREC
- Interseeding corn and alfalfa – Austin Kraklau, NCREC research specialist
- Microbiome and biological products – Barney Geddes, NDSU Department of Microbiological Sciences assistant professor
- Soybean insects – TJ Prochaska, Extension crop protection specialist at the NCREC
- Soil Health – Leo Bortolon, Extension cropping systems specialist at the NCREC; Ryan Buetow, Extension cropping systems specialist at the Dickinson Research Extension Center; Rogers

Lunch will follow the tour around 12 noon. We hope you can join us!

Fig. 1. Field day at North Central Research Extension Center

TJ Prochaska
Extension Crop Protection Specialist
NDSU North Central Research Extension Center

Leo Bortolon
Extension Cropping Systems Specialist
NDSU North Central Research Extension Center

NORTHEAST ND

The rainfall in the NE area ranged from 0.27 to 1.24 inches in the last week. In certain counties, crops were starting to show moisture stress in sandy areas and knolls. Crops are progressing quickly with good moisture and temperatures. Small grains are good to excellent ranging from booting to heading stages. With increasing humidity levels, the risk of fusarium head blight is increasing in our area. Several farmers are already spraying their fields with fungicides or are getting ready. Cereal aphids are showing up in wheat and barley. Corn is good to excellent as well ranging from V8-V12 stages. Soybeans are coming along well and are variable in their growth stages from V2 to R1.

Iron chlorosis is still being reported in several areas where the beans are looking tough. Canola is looking good to excellent. Grasshopper reports are calming down with very few fields needing to be sprayed. A lot of hay on the ground right now and reports of blister beetles remain but not as bad as last year.

Figure 1: Soybeans showing IDC symptoms in Grand Forks County (Katelyn Landeis, ANR Extension Agent, Grand Forks County)

Figure 2: Barley(Left) and wheat fields(Right) at heading stage (Anitha Chirumamilla, LREC and Katelyn Landeis, ANR Extension Agent, Grand Forks County)

The NDSU Langdon Research Extension Center (LREC), in cooperation with the Northern Canola Growers Association, is holding the 2022 Annual Field Day Thursday, July 21, 2022, at the Center. The event starts at 8:30 am and ends at noon followed by a meal. The field tour will feature a variety of topics addressed by several NDSU Researchers and Extension Specialists. Registration is not required for this event.

An on-farm Intercropping Field Tour will be happening July 27th in Pierce and Rolette Counties highlighting local farmers' experiences with intercropping. Intercropping is the growing of two crops together in the same field and harvesting them for grain at the same time. Attendees will see intercropping in action and be able to ask questions of current practitioners. This will be a unique opportunity to join a discussion with farmers themselves how they have adapted their equipment and operations to plant, manage, harvest, and separate two crops simultaneously.

The tour will start at 2:00 pm at Lee Farms located at 5350 78th St NE, Bisbee, ND 58317 and will end at 5:30 pm 3 miles west of the Hwy 30 and 66 intersection at 8557 51st Ave, Mylo, ND 58353. A supper will be provided. Attendees are asked to register online www.ndsu.ag/intercropping to help plan the meal. For questions about the event, contact Anitha Chirumamilla at 701-256-2582. For questions about intercropping, contact Paul Overby 701-351-0913.

Figure 3: Cereal aphid in Barley in Cavalier County (Anitha Chirumamilla, LREC)

Anitha Chirumamilla
Extension Cropping Systems Specialist
Langdon Research Extension Center

SOUTH-CENTRAL/SOUTHEAST ND

According to NDAWN, the region's rainfall during April 1-July 11 ranges from 8.8 inches (Linton; Emmons County) to 16.9 inches (McHenry; Eddy County), with the Carrington REC receiving 14 inches and Oakes irrigation research site at 15.9 inches. Accumulated growing degree days for May 15 planted corn is similar to the long-term average and ahead in units by the equivalent of one leaf generally east of Highway 281.

Crops are rapidly developing. Winter rye is mature and winter wheat is in the dough stage. Spring-seeded crop growth stages are quite variable among fields. However, mid-May planted corn is in the mid-vegetative growth stages (generally V10-12), wheat is heading to flowering, soybean are flowering, and field pea and canola are developing pods and seed. Timely planted dry bean are near flowering and sunflower is starting the reproductive stages (R1).

Fungicide application in wheat, herbicide application in late-planted row crops, and haying continue when weather conditions permit.

Carrington REC winter wheat variety trial, and canola in flowering and pod development stages (picture taken July 11).

Greg Endres
Extension Cropping Systems Specialist
NDSU Carrington Research Extension Center

weather

WEATHER FORECAST

The July 14 to July 20, 2022 Weather Summary and Outlook

The past couple of weeks have tended to be either quite wet or quite dry depending on if you are in western or eastern North Dakota. Much of western North Dakota has recorded several thunderstorm clusters. In many of my talks this last winter, I had mentioned that Montana and the Prairie Provinces of Canada could have average or above precipitation this year, and in turn, a much-improved year over 2021 for small grain production. This prediction was due to expected southwesterly upper-level wind coming in from the Pacific Ocean, providing a wet flow for the northern High Plains and the Prairie Provinces of Canada. That flow is represented by the yellow line in Figure 1 below. That flow in combination with a low level jet, represented by the green arrow in Figure 1, bringing in additional moisture from the Gulf of Mexico has helped feed moisture into the thunderstorms that have developed over Montana. Many of these storms then turned southeasterly moving into western North Dakota before dissipating near the Missouri River. This pattern looks to be breaking down with the thunderstorm clusters that will form the next couple of weeks, mostly staying in Canada, but the odds favor at least some of the moisture moving through North Dakota, just not as regularly as it has been in the past few weeks.

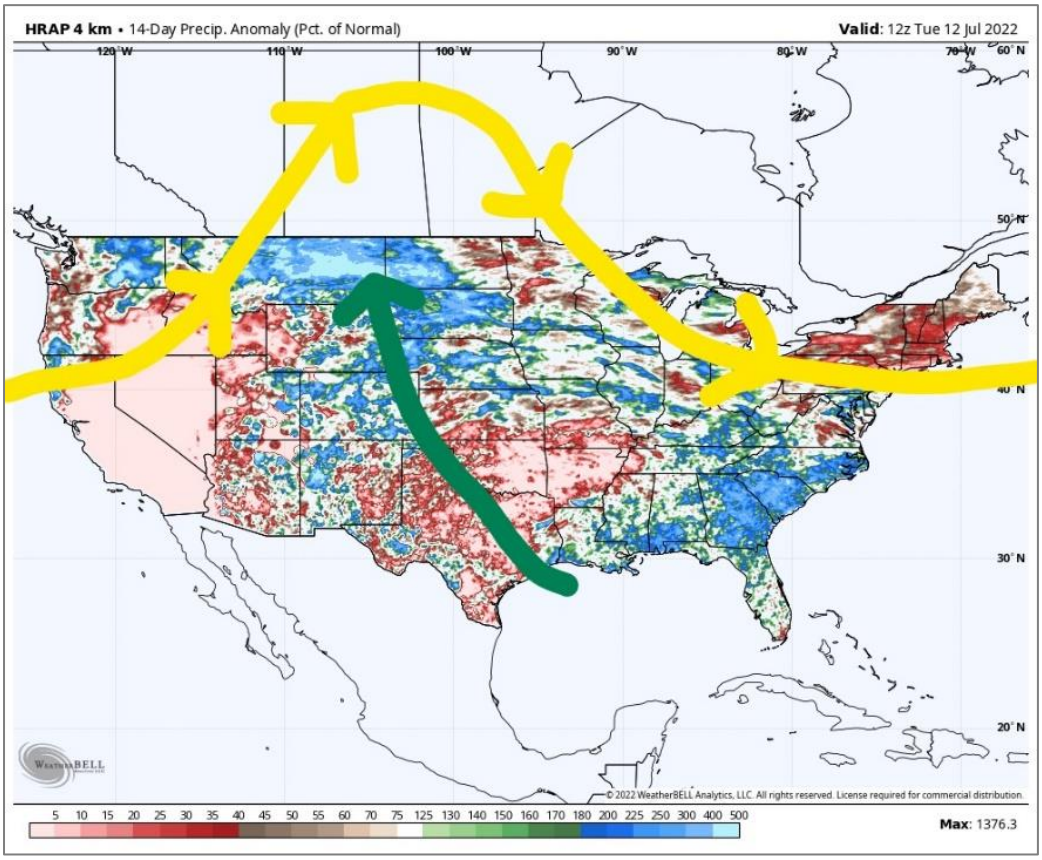

Figure 1. Percent of Average Rainfall for the 14-day period ending at 7:00 AM CDT on Tuesday, July 12, 2022

Although many parts of Montana into western North Dakota have been wet recently, eastern North Dakota into northwestern Minnesota have been dry. There were some thunderstorms this past weekend that hit some parts of eastern North Dakota and western Minnesota, but it was very much hit and miss on amounts (Figure 2). These next 7 days look to continue that trend of hit and miss type of storms with most areas not seeing significant rain amounts, but instead, probably narrower bands of moisture that are nearly impossible to forecast where they will hit. Where those storms do hit, severe weather is always a possibility this time of year and although not expected to be widespread, some narrow bands of higher rainfall may occur.

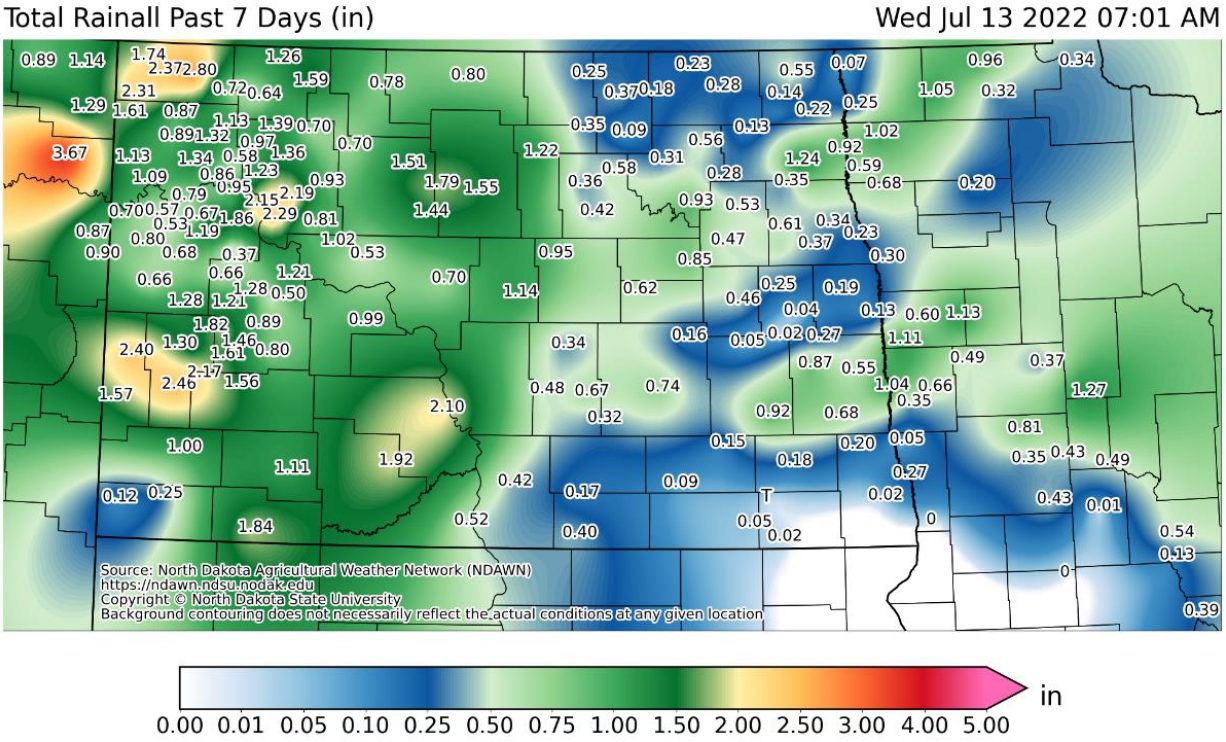

Figure 2. Total rainfall for the 168-hour period ending at 7:00 AM on July 13, 2022 at NDAWN stations

The rain in the next week to ten days may be hit and miss, but there are many reasons to believe the heat will be widespread as we move through the rest of July. It appears some of the heat you may have heard about to our south will be pushing north. What this means is above to well above average temperatures are expected in our region, especially next week. This past week most areas recorded above average temperatures (Figure 3) and even warmer temperatures may be experienced in the next 7 to 10 days.

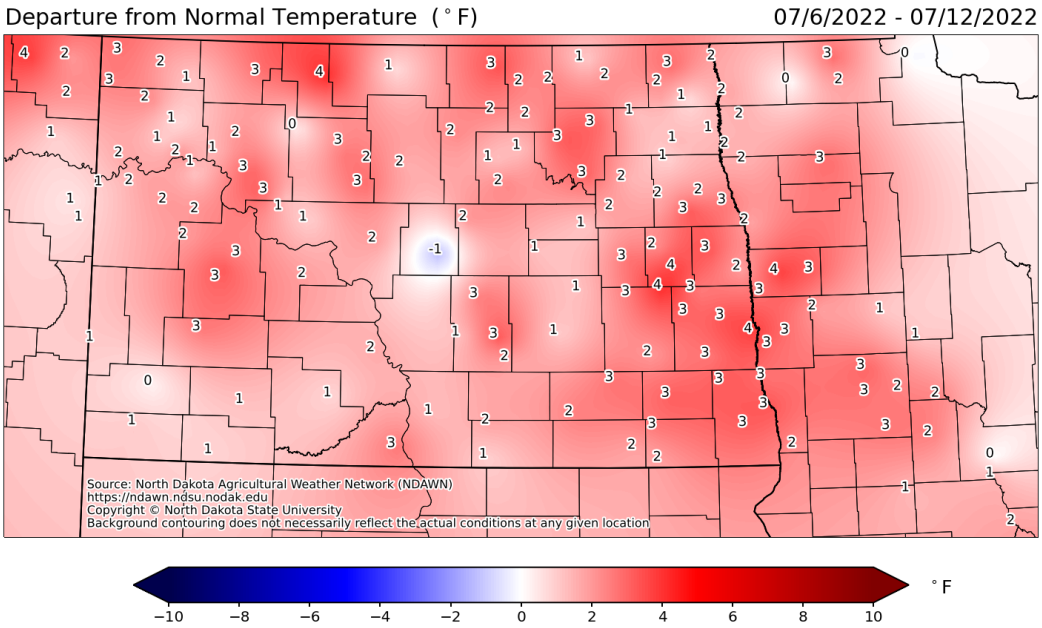

Figure 3. Departure from Normal temperature at NDAWN stations for the period of July 6 through July 12, 2022

Figures 4 and 5 below are forecasted Growing Degree Days (GDDs) base 32° (wheat and small grains) and 50° (Corn and Soybeans) for this forecast period. As a reminder, GDDs are capped at a maximum temperature of 86° meaning heat units will be lower than you may expect based on the actual maximum on some days.

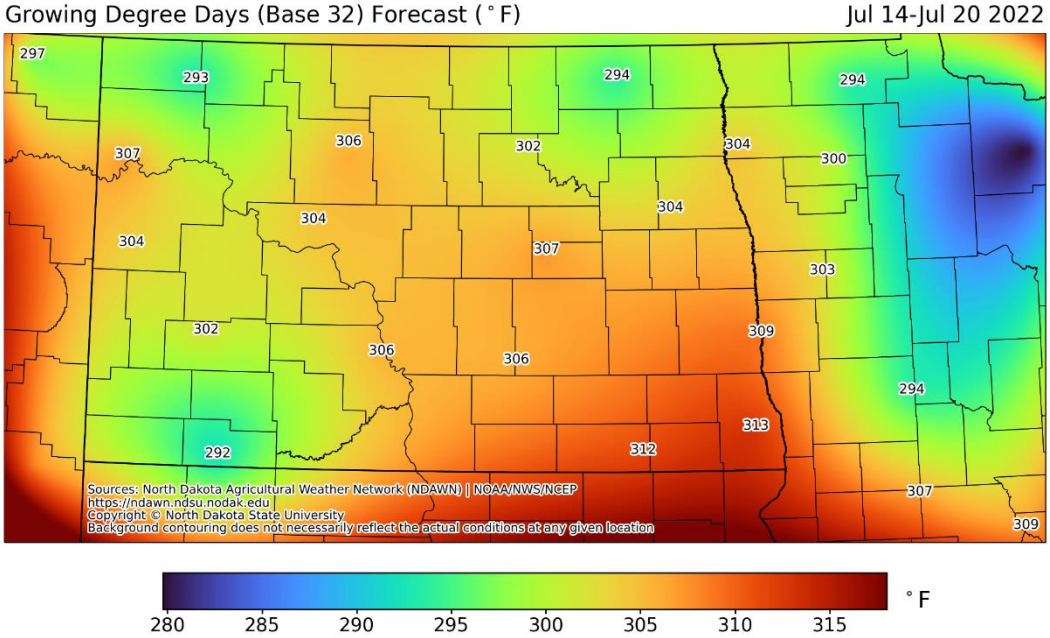

Figure 4. Estimated growing degree days base 32° for the period of July 14 to July 20, 2022.

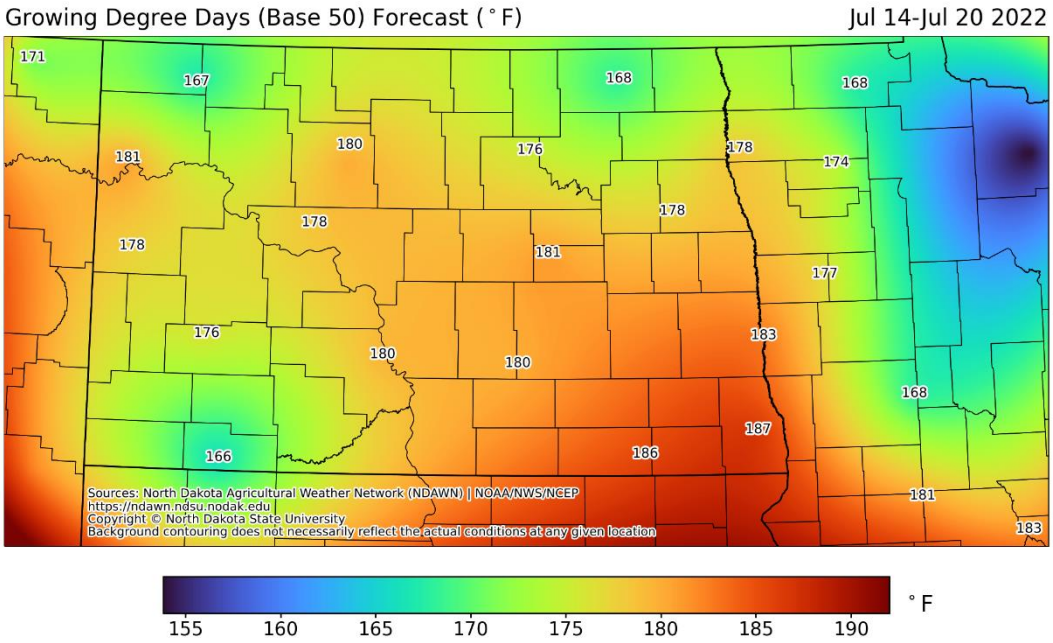

Figure 5. Estimated growing degree days base 50° for the period of July 14 to July 20, 2022.

Using May 15 as a planting date, the accumulated growing degree days for wheat (base temperature 32°) are given in Figure 6. You can calculate wheat growing degree days based on your exact planting date(s) here: https://ndawn.ndsu.nodak.edu/wheat-growing-degree-days.html

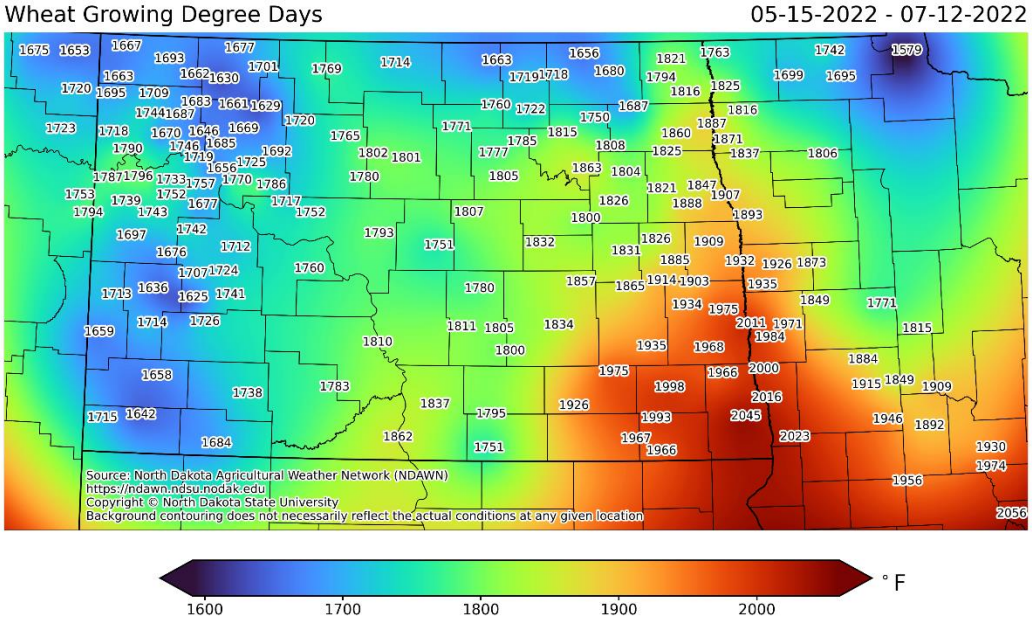

Figure 6. Wheat Growing Degree Days (Base 32°) for the period of May 15 through July 12, 2022.

Using May 20 as a planting date, the accumulated growing degree days for corn (base temperature 50°) are given in Figure 7. You can calculate corn growing degree days based on your exact planting date(s) here: https://ndawn.ndsu.nodak.edu/corn-growing-degree-days.html.

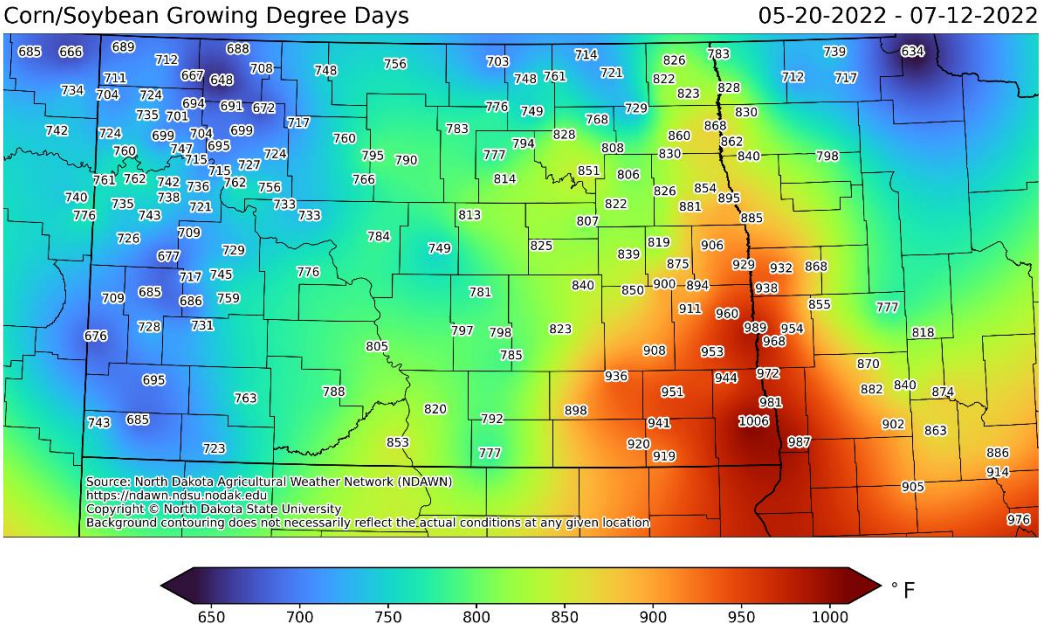

Figure 7. Corn Growing Degree Days (Base 50°) for the period of May 20 through July 12, 2022.

Soybeans also use base 50° like corn, but NDAWN has a special tool for soybeans that, based on your planting date and cultivar, can estimate maturity dates based on average temperatures, as well as give you GDDs based on the planting date(s) you set. That tool can be found here: https://ndawn.ndsu.nodak.edu/soybean-growing-degree-days.html

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